PROCEDURES IN NURSING

ANNABELLA McCRAE

PART II

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PROCEDURES IN NURSING

PRELIMINARY AND ADVANCED

BY

ANNABELLA McCRAE

Instructor in Practical Nursing

AT THE

MASSACHUSETTS GENERAL HOSPITAL
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BOSTON

PART II

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INTRODUCTORY NOTE

PART II offers procedures for some of the more advanced medical and surgical nursing.

The more common treatments of eye, ear, nose, and throat are outlined, which may prove helpful to those who have had experience in these lines, and to those who at any time may meet such conditions in general nursing practice. For the use of this material indebtedness is acknowledged to Dr. Harris P. Mosher, chief of service in the Laryngological Department of the Massachusetts Eye and Ear Infirmary, and to Miss Helen O. Potter, assistant Superintendent of Nurses of its Training School, and her assistants; and also for opportunity for observation in the wards and operating room.

Appreciation is again expressed to all those whose coöperation and valuable suggestions in the preparation of Part I have extended throughout Part II.

A. McC.

February, 1925.

PART II

XXXIX

HOT AIR BATHS

Hot air or sweat baths are used to increase the functional activities of the skin and kidneys in such conditions as are associated with acute or chronic nephritis, namely, edema, anuria, or complete suppression, and in the early symptoms of uremia. They may be prescribed, also, in rheumatism to assist the elimination of certain acid bodies and toxins in the blood, to soften the fibrous tissues and lessen the stiffness of affected joints, and to relieve pain.

There are many methods employed and various appliances used for this treatment, such as the electric light or bunsen burner in place of the alcohol lamp, and for those who can sit up, the electric light cabinet. As a rule the treatment is best given in bed to patients who may suffer a setback from exposure or change of atmosphere, such as nephritic and rheumatic patients.

Points to be remembered during the bath

Patient should be given an opportunity to empty bladder before starting. Oversight of this may be the cause of great discomfort because of the effect of the treatment on the kidneys. The amount of urine voided immediately after the bath, if any, should be observed. In dropsical conditions the patient is sometimes weighed before and after the treatment to learn the extent of elimination.

If not on limited fluids the patient is given cool water or orangeade to drink at intervals of ten or fifteen

minutes throughout the hot air treatment. In nephritis, if the patient is edematous and on restricted fluids, the amount taken during confinement in the hot air bath goes into the sum total of 24 hours. The amount of fluids allowed in such cases is 60 ounces in 24 hours.

Note temporal pulse every ten minutes.

Watch thermometer closely. In some cases temperature of bath may be permitted to go as high as 140° F. before discontinuing the treatment.

Bathe patient's face with cool water for comfort during bath.

Have a second lamp ready to replace first if necessary, so that an even temperature may be sustained.

Take all precautions to avoid fire, using a damp cloth around funnel, and keep an extra blanket on hand.

If for any reason the nurse should be called away, a written note regarding present temperature and expiration of time of bath should be pinned to the cradle, and the head nurse should be notified. In any case the patient should be under close observation.

Equipment

5 gray blankets
2 large rubber sheets
patient's towel
rubber pillow case
gauze sponge
gauze head binder
ice cap
hot water bag
dairy thermometer
enameled basin
bathing solution
long wooden cradle
asbestos covered funnel and oven attachment to hold lamp
2 metal alcohol lamps, or can of solid alcohol
matches
pitcher of cool water or orangeade and drinking tube

Procedure

Preparation of bed and patient

Loosen upper bedclothing and remove spread. Turn back bedclothing at foot of bed, even with mattress, and at waist line from the head.

Place gray blanket over patient. Turn down bedclothing as usual to foot of bed. Fold neatly and remove.

Slip rubber case over pillow. Place a towel under patient's head. Turn patient and move to opposite side of bed. Unbutton nightgown.

A second blanket is used as a protective covering against accidental burning of the patient, and is also arranged for comfort, so that no two opposing surfaces of the skin are in contact, in the following manner: one of the blankets is doubled in two crosswise, and while the patient is still on his side it is placed on the bed with the fold towards his back and as high on the pillow as his head. The upper half is gathered and pushed under his back and thighs, the remainder tucked against his back. The patient is now rolled over facing the nurse, and the blanket is pulled through on the opposite side.

The patient is turned on his back and nightgown is removed. His arms are raised above his head and the first side of the blanket at the top is placed across his chest as high as the axillary spaces and tucked in on the opposite side. The remainder of the blanket on the same side is tucked between the patient's thighs and knees and as far as it reaches. The patient lowers his arms to his sides and the second side of the blanket

is brought down in a straight fold over the shoulder, then turned sharply upon itself and carried over the opposite shoulder securely. Remainder of blanket is tucked under body.

A gauze head binder is wrung out in cold water and brought around from back of neck, and around head in turban fashion. Over it is placed the ice cap without a cover, the head binder taking its place.

A covered hot water bag at 125° F. is placed at the feet. The thermometer, which is attached to the rung of the bed above the pillow by a string, is placed in the region of the pelvis.

The cradle is placed in position and funnel and oven are attached to foot of bed, slightly at one side, to avoid the feet. A blanket is placed over cradle crosswise, over patient's shoulders, carried under lower pillows, and securely tucked under mattress.

Another blanket covers remaining portion of cradle, securely tucked in at foot of bed, snugly enveloping the funnel to prevent escape of hot air.

Administration and observation

Light the lamp and place in the oven. Note the time.

Two rubber sheets are added and arranged in the same manner as the blankets. Two more blankets are placed over rubber sheets. Finally, over all, the spread is put on and tucked under patient's chin to prevent contact with rough blanket. The end of spread is folded under itself even with foot of cradle to avoid coming in contact with hot oven and funnel. The temporal pulse is noted and the patient is given a drink.

At the end of twenty or twenty-five minutes note temperature of bath by carefully drawing the thermometer by the string to the edge of the blanket and reading the scale without exposing the bulb or permitting escape of hot air. Frequent observation of the patient's temporal pulse should be made throughout the bath.

If no special order has been given for the duration of the bath, and the temperature has reached 120° F., the bath may be continued fifteen minutes longer, unless it is contraindicated by the patient's condition, *i.e.*, weak and rapid pulse, restlessness, and a sense of oppression, flushed face and dry skin. If these signs are observed, the light should be extinguished at once and the patient's condition reported. The alcohol sponge and rub, part of the usual procedure, would then follow immediately.

Removal of blankets, cradle, and funnel

The light is put out and bedclothing is loosened to permit escape of hot air and slow evaporation of moisture from the patient's skin.

In about fifteen minutes all rubber sheets are removed and all blankets over the patient, save one, which is adjusted lengthwise to cover him fully, and tucked behind his shoulders to hold it in place. The funnel and cradle are then removed. The blanket in which the patient is enveloped is loosened on each side and serves as an under blanket during the sponge bath. The ice cap and head binder are left on until the end of the bath.

The sponge bath

While the patient is drying, preparations are made to give him a ten-minute sponge to restore the tone to the relaxed muscles, to cleanse the skin from the products of the sweat and sebaceous glands, and to refresh. A basin with one part of bathing solution to twenty parts water is used at 100° F.

The sponge is given in the same order as the alcohol bath in febrile conditions, except that towel friction is used altogether and exposure of the body is avoided in order not to chill the patient.

After the bath is finished the hot water bag may be refilled at the usual temperature and placed at the patient's feet. In some cases the blanket is allowed to remain over his body so that the activity of the sweat glands may be continued. The pulse is noted and the patient is allowed to rest.

XL

PACKS

A pack is the application of heat or cold to the body, in dry or moist form, through the medium of blankets or sheets.

HOT DRY PACK

When stimulation of the skin and kidneys is desired, the hot dry pack is sometimes used in place of the hot air bath, as a less extreme measure. It may also serve as a substitute when equipment for the hot air bath is not available in private practice.

Equipment

4 blankets
large rubber sheet
head binder
gauze sponge
patient's towel
4 hot water bags, or substitutes. See page 110
ice cap
basin with ice water
bathing solution
pitcher of cool water and drinking tube

Procedure

It is less disturbing to the patient to have the first arrangement of the blankets and rubber sheet prepared before bringing to the bedside. The pack is so arranged that the three blankets and rubber sheet are

introduced together under the patient, with the canvas side of the rubber sheet next to the bed.

Double the rubber sheet in two, rubber side out, and with open edges towards the nurse.

Double the three blankets crosswise in order to have each even with the others and the rubber sheet. Place the folded crease of the first blanket even with the folded crease of the rubber sheet underneath.

Throw back the upper half of the blanket. Arrange the other two blankets on top of the first in the same way, one over the other, so that a single layer, or half of each blanket, is lying upon the doubled rubber sheet. Grasp the edges of the blankets and the upper edge of the rubber sheet with both hands and fold over to the center crease and again upon itself. Next, grasp the folded thicknesses, raise and swing the remaining half of the rubber sheet to the opposite side. The remaining half of the three blankets and rubber sheet are drawn forward in three or four fan-like folds meeting the folded thicknesses. These are brought together and compactly folded end to end in thirds and carried to the patient's bedside.

The upper bedclothing is turned down to the foot of the bed with the fourth blanket. The rubber pillow case is drawn over the cotton one. The patient is rolled on his side and the fan-folded part of the blankets and rubber sheet are slipped under him together. All are placed high enough on the pillow to cover his shoulders later. The nightgown is removed and each blanket in turn, and finally the rubber sheet is wrapped around the patient in the same manner as

the enveloping blanket in the hot air bath, except that they are turned under the feet. If not long enough an extra one may be used to cover the feet.

A hot water bag, half full and free of air, temperature 140° F., is placed on each side of the patient, a third is placed under his knees, and a fourth at his feet, all outside of the blankets. Finally the large rubber sheet is wrapped about all to keep in the heat. The fourth blanket, which was used to turn down the bedclothing, may be folded across and laid over the rubber sheet. The upper bedclothing is drawn up and the sheet tucked under the patient's chin to prevent contact with blanket.

The head binder is wrung out of ice water and applied, and over that, the ice cap. The patient's temporal pulse is noted and a drink of cool water given every ten or fifteen minutes, if on forced fluids. The patient is usually left in the pack from thirty minutes to one hour.

Sponge bath

This treatment is followed with an alcohol sponge and rub, with the temperature between 85°–95°. While giving the sponge, avoid exposure of patient and consequent chilling by too sudden change of temperature.

HOT WET PACK

A hot wet pack, because of its moist, penetrating heat, is usually more effective than the hot air bath or hot dry pack when quick stimulation of the elimina-

tive organs is desired, in such cases as uremia and general edema, in acute nephritis, in renal irritations following corrosive poisoning, and occasionally in the toxemia of pregnancy to ward off convulsions.

Equipment

4 gray blankets
large rubber sheet
half sheet and rubber protector for bed
canton flannel half sheet and broomsticks to serve as wringers
rubber pillow case
gauze sponge
face towel
head binder
ice cap
hot water bag with cover
round enameled basin
foot tub
pint graduate
bathing solution
bath thermometer
pitcher of cool water and drinking tube

Sandwich of blankets and rubber sheet for envelopment of patient

Double first gray blanket crosswise. (Fig. I.)

Fold rubber sheet, cotton side out, with its fold matching that of the blanket. (Fig. II.)

Fig. I

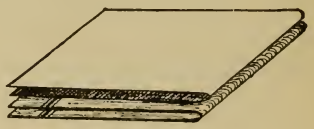


Fig. II

Open rubber sheet and place upon it the second blanket, folded in the same way. (Fig. III.)

Open top blanket and grasp upper edge of first

blanket and edges of rubber sheet and second blanket. Fold to center and then fold again. (Fig. IV.)

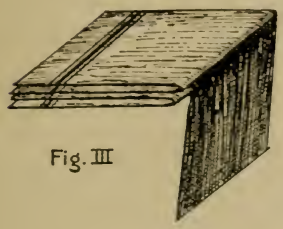


Fig. III

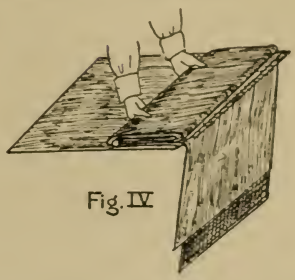


Fig. IV

Grasp folded thicknesses, raise and swing remaining half of lower blanket under to opposite side. (Fig. V.)

The unfolded remaining half of the two blankets with rubber sheet between is drawn up in three fan-like

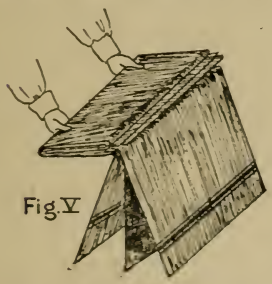


Fig. V

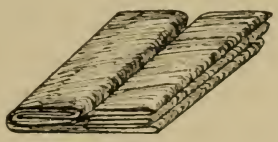


Fig. VI

folds (Fig. VI) meeting the folded side, and the two folded sides are brought together, as in Figure VII. They are folded end to end in thirds, as in Figure VIII, ready to be taken to the patient's bedside.

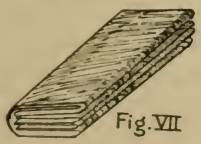


Fig. VII

Fig. VIII

Third blanket

The third blanket, which should be rather light weight, serves as the hot wet application and is folded across, then each side gathered in fan-like folds towards the center of the blanket. The folded sides are brought together, as in Figure VII, then folded end to end in thirds, as in Figure VIII, and placed within the canton flannel half sheet in the foot tub, ready for saturation with hot water later.

Preparation of the patient

The fourth gray blanket is used to turn down the upper bedclothing in the usual way. The half sheet with rubber protector is placed at the foot of the bed to protect the mattress below the margin of the draw sheet at the patient's feet. The rubber pillow case is slipped over the cotton case of the top pillow. The patient is turned on his side and the nightgown is unbuttoned. Putting the fan-like folds towards the patient's back, place sandwiched blankets and rubber sheet high enough to cover the pillow, then slip lower part under the patient's legs. He is then turned towards the nurse and the remainder of the blankets and rubber sheet pulled through and adjusted. The patient is rolled on his back and the nightgown removed.

The blanket comes next his skin and serves as a protection against burning. Cover by bringing the first side of this blanket across his chest as high as the axillary spaces. Push the blanket down between his legs as far as the ankles, so that there are no opposing

skin surfaces. The second side of the blanket is drawn snugly at the back of the patient's neck and brought down in a straight fold over the shoulder; it is then turned sharply upon itself and carried over the top of the opposite shoulder. The remainder of the blanket is tucked smoothly under the patient's body.

Wring the head binder out in the ice water and encircle the back of the neck and head. The patient is turned on his side and the blanket which was used to turn down the bedclothing is loosely thrown over him.

Preparation and application of hot wet pack

The blanket in the canton flannel half sheet is well saturated with water at 140° F. A nurse and an assistant stand opposite each other, with the tub between them. Each takes a stick and rolls an end of the half sheet over it, securing it firmly by folding the selvage edges over the stick. Both continue to roll and twist the sticks in opposite directions until the blanket is wrung as dry as possible, when the sticks are removed. The foot tub is emptied and used to carry the blanket, still enclosed in half sheet and covered by a small rubber sheet to hold in the steam, to the bedside.

The steaming blanket is removed from the half sheet, partly unfolded on the bed, and quickly applied by placing its center against the patient's back. The first half of the blanket is carried over the patient; the other half, which is still in folds, is passed under his legs. As he is being turned on his back the remainder is pulled through and quickly wrapped about him under cover of the blanket.

The rubber sheet, being next in order, is applied by bringing its first side in a straight line over one shoulder, which is turned sharply upon itself and carried over to the opposite shoulder. The second side is folded in the same way and its loose edges tucked alongside of the patient.

The ice cap is applied over the wet head binder.

The loose fourth blanket is removed and the last blanket of the sandwich is wrapped about the patient, like the rubber sheet.

A covered hot water bag at 125° F. is applied to the feet, which are kept outside of the pack.

The fourth blanket is folded across and replaced over the patient; the bedclothing drawn up and the upper sheet fitted under the chin to prevent contact with blankets.

Observations

The time is noted and temporal pulse taken. If not on limited fluids, cool water is given through a drinking tube at intervals of ten or fifteen minutes. Frequent observations of the pulse are made for feebleness, and of the general condition of the patient for signs of faintness or prostration. Sweating should take place in twenty minutes. The patient usually remains in the pack thirty minutes.

Removal from pack

Turn down the upper clothing. Loosen enveloping blankets and rubber sheet on each side under cover of

the fourth blanket, as sudden chilling of the patient should be avoided. Remove ice cap. Turn patient on his side. Fold the moist blanket within the rubber sheet and remove, together with the protective blanket, which has been next to the body. The patient is turned on his back and is now lying on the remaining blanket, which has been part of the pack. Replace ice cap and prepare the water for the sponge bath.

The sponge bath

The sponge bath is carried out as in the hot air bath or hot wet pack.

Completion of the pack

The ice cap, hot water bag, and under blanket are removed. The patient is turned on his back, the rubber pillow case taken off, the nightgown put on, and the upper bedclothing pulled up in the usual way. The blanket next the patient's body is added when needed to continue the effects of the pack.

The pulse and general condition of the patient are noted. The bedside is left in order and all equipment is neatly stacked together and carried out to the lavatory and attended to. The wet wringer and blanket are hung up to dry, with the blanket which protected the patient.

COLD PACK

A cold pack is given for its tonic and sedative effect upon the nervous system in cases of chorea, delirium, insomnia, or in conditions of nervous exhaustion.

Equipment

- 3 gray blankets
- large rubber sheet
- large cotton sheet
- half sheet and small rubber sheet
- head binder
- gauze sponge
- patient's towel
- ice cap
- hot water bag with flannel cover
- basin with ice water
- foot tub with water 75° F.
- bath thermometer
- bathing solution

Preparation of blanket and sheet

Blankets and rubber sheet are folded as described in hot wet pack. A half-worn cotton sheet is best, because of its soft texture. Its selvage edge on one side is folded back so as to give a width sufficient to cover the patient from neck to ankles, while its length will fully envelop him. Each hemmed end is rolled towards the middle of the sheet until they meet. The sheet is now wrung out in the tub of water either with a clothes wringer or by hand, when the process is carried out by grasping the sheet at one end with both hands and forcibly twisting in opposite directions until the other end has been reached. The sheet is carried to the bedside in a basin.

Putting the patient in the pack

The procedures in turning down the upper bedclothing, application of rubber pillow case, half sheet and rubber at foot of bed, the introduction of the sandwich of folded blankets and rubber sheet under the

patient, application of cold head binder, ice cap, and hot water bag, are carried out in the same order as that of the hot packs.

While the patient is lying on his side with his back to the nurse, the moist sheet is applied, with its center to his spine, when its upper side is quickly unrolled and slipped under the upper arm and over the body to the opposite side. The second half of the sheet is pressed against the lower edge of the patient's back and pushed under his legs. He is then turned and the remainder of the sheet drawn through on the opposite side. The first half of the sheet is brought over the patient's chest and tucked under the opposite arm and between the thighs and legs down to the ankles, so that all parts of the body come in contact with the sheet. The patient is now lying with each arm down by his side ready to be enveloped with the second side of the sheet, which is carried over one shoulder in a straight line, then sharply turned and tucked over the opposite shoulder and along his side. He is next enveloped in the blankets and rubber sheet upon which he is lying. The blanket, which serves as a covering, is removed and the bedclothing is drawn up. The patient may shiver for a moment from the shock of the first application of the moist cold, but when the air is shut out by the quick application of the first blanket, the sense of discomfort disappears as soon as reaction sets in. This should be followed by relaxation, languor, and sleep. If awake, the patient is given a drink, warm or cool, as he prefers. The temporal pulse is noted at frequent intervals, and the color and expression of the face.

The patient is usually left in the pack, if reacting satisfactorily, from forty minutes to one hour, then removed and given a ten-minute sponge with friction.

If not reacting inside of twenty minutes, unfavorable indications would be a sense of chilliness or faintness, weak pulse and pinched expression. Under these circumstances, remove from the pack and give brisk friction with a warm towel, avoiding exposure to air; roll up in a warm blanket; or apply hot water bag and give hot drink.

COLD PACK AND SHEET RUB

This treatment is prescribed in febrile conditions, as that of typhoid fever, for stimulation of the vaso-motor system, for its sedative effect in restlessness and delirium, and for reduction of a high temperature.

Equipment

small rubber stand cover
gray blanket
large cotton sheet
large rubber sheet
rubber pillow case
head binder on ice
patient's towel
ice cap
hot water bag
basin of water at 70° F.
foot tub of water at 80° F.
whisk broom
gauze sponge
short-sleeved cotton gown for the nurse

Preparation of the sheet

The cotton sheet is folded along one selvage edge and measured to cover the patient from neck to ankles.

It is then rolled from each end towards the center, as in the cold pack, is then wrung out of the water at 80° F. and carried to the bedside in a basin.

Packing the patient

If a typhoid patient, unusual care is exercised in moving him. Turn down the upper bedclothes with the gray blanket in the usual way. In communicable diseases the pillow next to the patient is protected with a rubber case under the cotton one. The cotton case is removed. The patient is turned on his side, nightgown unbuttoned, and rubber sheet placed lengthwise upon the bed with its upper edge high on the pillow above the patient's shoulders. The edge of the rubber sheet is slipped under the patient, who is then turned on his back, and the sheet adjusted on the opposite side. The nightgown is removed and head binder is applied. The patient is again turned on his side and the sheet applied as in the cold pack. A hot water bag at 125° F. is applied to feet under rubber sheet, and ice cap to head. Remove blanket, which leaves patient exposed to air in wet sheet. The face is bathed with gauze wrung out of cold water.

In five minutes the sheet is usually warm with the heat absorbed from the body, and is cooled again by dipping the broom in the basin of water at 70° F. and sprinkling the exposed surface of the sheet until quite wet. In order to stimulate reaction, the sprinkling is followed by light, brisk rubbing with the sheet from shoulders to feet, avoiding the abdomen. To get a purchase on the sheet in rubbing, it is necessary to lift

its clinging folds slightly from the patient's body. If the patient's condition favors reaction, *i.e.,* good quality of pulse and no cyanosis or rigor, the process of sprinkling and rubbing may be repeated. The patient is next turned, and his back and also the back of his thighs and legs are sprinkled and rubbed. The whole treatment lasts from twenty to thirty minutes, the time depending upon the physical toleration of the patient. Jerky motions should be avoided while rubbing the patient.

With the patient still on his side, the gray blanket is replaced, the ice cap and head binder removed. The hair is dried, if wet. The first half of the wet sheet is removed and its lower end slipped under the patient's legs along with the rubber sheet, which is folded instead of rolled upon itself to avoid wetting the canvas side. The patient is dried from the back of his neck to his heels, using light friction with the towel. He is then turned on his back upon the dry bed. The wet sheet is removed and lifted into the basin, also the folded rubber sheet. The drying of the patient is completed. Replace the cotton case and the nightgown. The hot water bag is refilled and put at the patient's feet, if needed. Draw up the bedclothing with the gray blanket.

Note the patient's general condition. Take drop temperature, pulse, and respiration one-half hour after removal from pack and record on four-hourly chart.

XLI

A SLUSH OR BED SHOWER BATH

A slush bath is the showering of water directly on the patient's skin by means of a large sponge, followed by brisk friction with the nurse's hands.

Purpose

This treatment is usually prescribed in typhoid fever when the temperature of the body is persistently high, accompanied by a steadily rising pulse; in the restlessness of delirium; and also in sunstroke.

Contraindication for baths

Baths are contraindicated in hemorrhage, in extreme abdominal distention, or if there is any serious change in the patient's pulse.

Reaction

For a good reaction much depends on (1) the way the bath is given, (2) the patient's general condition and height of temperature, (3) his normal robustness, and (4) his habituation to the use of cold baths in health.

In order that the shock of the bath may be lessened, a second nurse should be detailed to assist, so that while one nurse is showering the patient the other may be rubbing, thus insuring quicker reaction.

To avoid delay in the operation and unnecessary exposure of the patient between procedures, each nurse

should be provided with a sponge to bail out the water, and should assist the other in carefully turning the patient, preventing any effort on his part to help himself which might cause abdominal strain, or heart exhaustion. Open windows near the bed should be closed during the bath to avoid chilling the patient.

Equipment

special rubber table cover
3 heavy gray blankets
1 large rubber sheet
2 patient's towels
head binder wrung out of water and placed on ice
ice cap
hot water bag
grass sponge
2 pieces washed gauze
basin with block of ice
empty basin
foot tub of water, 80° F.
nurse's special rubber apron, and short-sleeved cotton gown
basin of hot, soapy water for nurse's hands

Method of making grass sponge

surgical gauze, ¾ yard
sheet wadding, one-half doubled sheet
absorbent cotton
Egyptian grass, a weed used in the manufacture of mattresses
red tambour cotton
needle and white thread

The folded gauze is spread on a table and upon the center are placed the sheet wadding, the absorbent cotton, and as much grass as two hands can hold together. The hard, loose stems are picked out and the grass is enveloped in the absorbent cotton, not too compactly, and the center and ends are overcast in

long stitches. This is covered by the sheet wadding applied in the same manner, then the surgical gauze, which is folded in and buttonhole stitched, if for typhoid patients, with red tambour cotton, along the center and at each end. If more than one typhoid patient is on baths, each sponge bears a patient's initials for identification. The grass center helps to make the sponge porous and permits ready absorption of water. The absorbent cotton and sheet wadding hold the water. The gauze adds to the durability of the sponge and holds it together.

Preparation of nurse, bed, and patient

At the bedside the nurse rolls her sleeves above her elbows, removes her uniform apron, puts on her rubber apron, and over that her long cotton gown. The upper bedclothing is turned down with the gray blanket, in the usual way. The cotton pillow case is removed, leaving the rubber case in place. The patient is carefully turned on his side, the nightgown unbuttoned, and the rubber sheet slipped under. The patient is then slowly turned on his back, the rubber sheet pulled through on opposite side, then turned over him on each side, temporarily.

An improvised tub is made by folding each blanket in fourths lengthwise, then rolling firmly and placing near the edge of the mattress on each side, reaching from the top of the pillow to the foot of the bed to give plenty of tub space. The edges of the rubber sheet are brought over the blanket rolls at each side of the bed, making the sides of the so-called tub. The

patient's arms are withdrawn from the sleeves of his nightgown, which is to be removed later. The blanket covering the patient is removed and folded across in the middle to fit the foot of the bed, then rolled tightly in fourths and placed across the extreme foot of the bed under the ends of the side blanket rolls to raise them up and give greater depth to the improvised tub. Binder and ice cap are applied to the head. A towel is folded part way, the double part covering the patient's abdomen and the single end tucked between the thighs, or a binder may be applied about the loins, pinned down the side. The hot water bag is placed under the rubber sheet at the feet.

A few sheets of newspaper are spread on the floor at the bedside, and a basin placed to catch any water that may drop. The temperature of the bath water, the time the bath is started, and the patient's pulse are noted. The bath thermometer remains in the tub.

Procedure

The nightgown is removed and the patient's face is bathed with cold water, using washed gauze. The grass sponge is then held under the water in the tub with both hands, lifted out and held about two feet above the patient, when the water is gradually squeezed from the sponge while it is carried back and forth over his body until it is showered. This operation is repeated until the patient lies in a pool of water. Friction and further application of water are kept up continuously, the nurse laving the patient with the water in which he is lying and rubbing briskly at the same time with

both hands from shoulders to feet to stimulate reaction, avoiding the abdomen. In phlebitis the affected extremity is not rubbed.

The basin on the floor is then placed on the side of the bed and the water about the patient is sopped

A SLUSH OR BED SHOWER BATH

In giving the bath the nurse stands at the right of the patient. To get the picture, however, the nurse stood on the opposite side.

up as quickly as possible with the sponge, which is squeezed into the basin, then turned back into the tub. Quietly place a small block of ice in the tub, leaving it until the temperature of the water is lowered to 75° F., at which it should be maintained until the completion of the bath. The ice is returned as often as the temperature goes above 75° F.

The patient is next turned slowly on his side and the ice cap placed at the back of his head. The back of his body is showered, including the thighs and legs. The procedure is repeated as already described.

The patient's pulse, color, and general condition are noted for quality every five minutes, between procedures. If all is well, the whole process is repeated.

Duration

The one procedure of showering the patient, applying friction, and removal of water from rubber sheet takes five minutes. This may be repeated four or five times, or twenty minutes for the whole process, the time being evenly divided between the anterior and posterior body.

Completion

While the patient is still on his side the ice cap and head binder are removed and put in the empty basin. The water is sopped up from the rubber sheet and the sheet folded upon itself at the patient's back, and slipped under the legs. The blanket roll at the foot of the bed is removed, the blanket doubled, and placed over the patient. The hot water bag is taken out. The abdominal towel is removed, and placed in basin. The back, upper arm, and legs are dried with a towel, using brisk, light rubbing. Care should be taken to dry thoroughly opposing surfaces of the skin, as arm spaces, groin, between toes, etc. Finally, the patient is turned on his back in the dry bed and the rubber sheet is removed without wetting the bed, by bringing the sides together first, then gathering it up

at each end, and folding it upon itself in the basin. The drying of the patient is completed. The cotton pillow case is replaced, nightgown put on, and bedclothing drawn over patient. If he is chilly, the special blanket is left on next to his body until he reacts, the hot water bag refilled, covered, and placed at his feet.

Treatment in failure of reaction

When there is failure of reaction, renew efforts in giving more vigorous rubbing, and lessen applications of water. If this fails, stop procedures, remove patient from bath, dry, wrap in warm blankets, apply hot water bags, give hot drink, watch pulse, and keep patient quiet. When reaction has set in and patient has recovered from shock, remove blanket and hot water bags.

Failure of reaction is indicated by:

cold skin and elevation of papillæ, or goose flesh
tense muscles
continuous shivering, in spite of rubbing
contracted arteries with small wiry pulse
cyanosis and pinched facial expression
shallow respiration
nervous irritability and dread of the operation

Benefit of the bath

The benefit of the bath may be determined by the condition of the patient afterward, as follows:

stimulating effect upon the vaso-motor system
improved quality of pulse, lessened rate, and increased arterial tension

stimulation of respiration, intake of more oxygen, absence of cyanosis, improved color
return from stupor to consciousness
quieting effect in delirium, evident when reaction follows first shock of the bath
influence in controlling the temperature
aid in elimination
prevention of bedsores and furunculosis

Method of charting the reaction

The temperature, pulse, and respiration are taken one-half hour after the bath, and are each recorded in red ink in running dots on the four-hourly chart in the same space and directly beneath the last notations of temperature, pulse, and respirations.

Disposal of equipment

A second foot tub, lined with a sheet, is kept at the bedside, in which are placed the three blankets used in the bath, also the ice cap and hot water bag when not in use, and the rubber table cover. The overhanging ends of the sheet serve to cover the supplies in the tub.

The basin of ice is emptied into the tub of water to make room for the grass sponge, towels, and washed gauze, which are tied up in the head binder. The newspapers are placed in the basin with the rubber sheet, which is stacked over the other basin.

The nurse's hands and arms are scrubbed with soap and hot water, two minutes for each hand and arm, including cleansing of the finger nails. The hands are

dried and the towel discarded. The gown is removed and hung on the screen hook, inside in, by the arm holes. The rubber apron is removed later. The remainder of the equipment is carried to the lavatory, avoiding contact with anything on the way.

The equipment is placed on the floor, until the shelf of the sink has been covered with newspaper. The bath thermometer is placed in its special jar of formalin solution 2%; the bath water is poured into the sterilizing hopper; the tub rinsed and emptied in the same place, then put into the utensil sterilizer.

If lavatories are limited in space, it may be necessary to use the bath tub for the large rubber sheet, if it is one that cannot be sterilized, or in the absence of a sterilizer. The sides and bottom of the bath tub are protected with newspapers. The remainder of the water is drained into the hopper from the rubber sheet, then it is spread over the top of the tub with its wet side uppermost, which is washed off with hot soft-soap suds, then dried with a hopper towel. The sheet is then suspended on its special bar to air. The towel used on the rubber sheet is added to the other things tied in the gauze head binder and sterilized for ten minutes. The newspapers are rolled up together in a clean newspaper, ready for the incinerator. Remove rubber apron and avoid touching tape neckpiece with the hands. The apron is washed with hot, soft soapsuds, dried with washed gauze, then snapped with the inside in and hung up beside the rubber sheet.

The nurse's hands are again scrubbed in a special basin in the lavatory and rinsed off, the water being

poured into the sterilizing hopper each time it is changed. The hands should be soaked for one or two minutes in bichloride of mercury 1–5000, then apply quince-seed hand wash.

As a personal precaution, one must not touch face or hair while handling materials that have come in contact with the patient directly or indirectly.

TREATMENT OF SUNSTROKE

Sunstroke is a cerebral disturbance of the heat centers and is caused by prolonged exposure to extreme heat, generally that of the sun on a humid day. The patient is usually in a state of unconsciousness, with an excessively high temperature (hyperexia). The temperature, which is taken by rectum, may range from 106° to 112° F. Such cases are frequently fatal, and are considered emergencies, calling for quick action in reducing the temperature by every means possible. It is easier to treat the patient in bed than in a bath tub. In case of collapse, two nurses or orderlies should give the bath.

If the slush bath is prescribed, the water is applied at a temperature of 65° or 70° F., with cold to the head and heat to the feet, and the routine of the bath is carried out as in the case of a typhoid patient, using plenty of friction following the showering.

The temperature and pulse are taken frequently and serve as a guide to the course of treatment.

The treatment is kept up until the patient's temperature begins to drop and his condition improves, *i.e.*, return to consciousness. Failure to respond to treatment would be followed by collapse.

XLII

SPECIAL BATHS

SITZ BATH

A sitz or hip bath is the immersion of the patient's pelvis and abdomen in hot or warm water in a low tub provided for the purpose.

This treatment may be prescribed for the relief of local pain and congestion in the pelvic or abdominal regions in such cases as delayed or painful menses, inflamed hemorrhoids, anal or urethral tenesmus, and in retention of urine.

For local treatment, the duration of the bath should be from ten to fifteen minutes, at a temperature of 110°–115° F. If given for sedative effect, the period should be thirty minutes to one hour at 94°–100° F.

A cool sitz bath is sometimes ordered for its tonic effect upon the intestinal tract in conditions of constipation. The temperature for this would be 68°–80° F. The period of immersion is ten or fifteen minutes.

Procedure

The patient is undressed and enveloped in a large, heavy bath blanket applied crosswise.

A gauze or compress cloth head binder is wrung out of ice-cold water and bound about the patient's head and neck.

The sitz bath is prepared with sufficient water to

cover the patient's hips. The temperature of the water should be tested before the patient is immersed.

The patient sits in the tub with his feet in a basin, or foot tub, of water at about 105° F., which helps to relieve the local congestion by increasing the blood supply in the extremities. The blanket is now arranged so that it envelops the tub and patient within its folds. If one blanket is not sufficient, two may be used.

After the treatment, the patient should be kept warm and allowed to rest.

In case a patient is too ill to sit up without support, this operation may be carried on at the bedside. The floor should be protected with newspaper or anything at hand that will serve the purpose. The tub may be placed close to the side of the bed, so that the patient may lean his back against it.

Additional support is afforded by placing a common chair on each side, back to the patient, who encircles the back of each chair with an arm. Under these conditions two blankets should be used. The first blanket is carried as high as the arm spaces, surrounding his knees and the tub, the other adjusted over his shoulders, giving freedom to his arms for self-support.

Substitutes for sitz tub

When the regular sitz tub is not available in giving this treatment, a small wash tub, or large pail, may be substituted. After pouring in the water, the edges of the tub may be padded with a large Turkish towel, or small blanket, arranged in folds and secured with a safety pin out of the way.

BRAN BATH

This bath may be given daily for soothing effect upon the skin. One pound of bran is used, in a thin cheese-cloth bag, to a bath tub of water at 95° F.

STARCH BATH

This bath is usually given daily, sometimes more frequently. In the opinion of some authorities, it is better than the bran bath for soothing effect in all kinds of dermatitis and in other skin conditions causing itching.

Cornstarch is more desirable than potato starch, because of its finer quality.

Two level teacups of starch are used in enough cold water to dissolve it. Add boiling water slowly until a thick, smooth paste is formed. Add to tub of water at 95° F.

The patient remains in bath twenty minutes to one-half hour. On completion of the bath the patient's skin is simply patted with a towel, permitting as much starch as possible to dry on.

BICARBONATE OF SODA BATH

This bath is usually given twice a day in cases when continued use of starch is over-drying to the skin, and in such cases as the itching of urticaria and the pruritis of jaundice.

Two heaping teacups of soda are added to a tub of water at 95° F.

MUSTARD BATH

Mustard baths are occasionally used in cases of convulsions in children.

For this treatment one tablespoon of mustard is used to six quarts of water at 105° F.

An infant should be immersed about five minutes; a child over a year old, ten or fifteen minutes.

SEDATIVE AND CONTINUOUS BATHS

Sedative baths

Sedative baths are given for their soothing and hypnotic effect in conditions of insomnia associated with nervous restlessness and in states of physical and nervous irritability. To be of benefit, the temperature of the water should be as near that of the body as possible, or between 96°–100° F., and the duration from twenty to thirty minutes. The patient reclines in the tub with the water above his shoulders; he may sit on a rubber air ring or an old blanket may be smoothly folded and placed in the bottom of the tub, and a rubber sheet may be placed over the tub to hold in the heat. If the water should become cool before the end of the treatment, the tub may be partly emptied and replenished with water at a higher temperature, mixed well in the tub, so that an even temperature is maintained.

To help out the hypnotic effect of the bath, the patient, on getting out of the tub, should be enveloped in a sheet and briskly rubbed dry, then put into a warm bed with light covering. Some form of nourishment should be ready, either hot milk or cocoa.

In the care of a mental patient who may be restless and irritable and who cannot be persuaded to remain in the bath for any stated time, he is usually permitted to get in and out of the tub at will. In such a case, the temperature of the water must be closely watched and the room be kept comfortably warm.

Continuous baths

Continuous baths are used when prolonged immersion in the water is desired, the length of time varying according to the patient's reaction to the treatment.

Hospitals that employ continuous baths have one or two rooms fitted up with tubs and apparatus for giving them.

While in the tub the patient reclines under water, supported by a hammock-like contrivance made out of smooth, strong canvas, in which are openings about one inch square, to permit the water to pass through. The hammock is suspended by means of brass eyelets in the canvas and hooks attached to the rim of the tub. A rubber ring or waterproof pillow supports the patient's head above the water. A blanket and rubber sheet cover the tub to hold in the heat. The heat of the water is regulated by a thermostat, and for safety, in case of any defect in the thermostat, a bath thermometer is kept in the tub with the patient, to be consulted at frequent intervals. The temperature of the water, usually between 96°–100° F., is prescribed by the doctor.

In psychopathic hospitals these baths are considered of great therapeutic value and are used instead of restraint in controlling the irritability and motor excite-

ment of acute mania, alcoholic delirium, and other states of active mental disturbances.

The patient is left in the bath until the stage of excitement is over, which may be a few hours or, in some cases, days at a time. In the quiet periods the patient is sometimes removed from the tub and placed upon a cot nearby, briskly rubbed dry with a large Turkish towel, and allowed to rest undisturbed until he again begins to show signs of restlessness, when the bath is prepared and the patient replaced in it. When the treatment is continuous for days at a time, the patient is removed from the tub daily, and the skin thoroughly dried and lubricated to prevent maceration.

If necessary, the patient is given an enema at this time. Between immersions, the tub should be drained and washed.

Continuous baths are also an emergency measure in the treatment of severe and extensive burns on the body, for the protection of the burned areas against the air, thus allaying pain and preventing shock. The water itself, if not above body heat, has a soothing effect upon the exposed nerve endings. The contact of the water also serves to keep the wounds clean, lessening the danger of sepsis later.

If the burns are caused by strong acids or alkalies, a neutralizing agent is added to the water, which increases its sedative effect. In burns from acids, sodium bicarbonate is sometimes used; while in burns from alkalies, a mild solution of boric acid.

XLIII

THE CARE OF MOUTHS IN SPECIAL MEDICAL CASES

Purpose

To prevent reinfection and complications from bacteria and sordes.

To promote cleanliness and comfort and preservation of the teeth.

To improve the sense of taste.

To enable the patient to articulate more distinctly, thus requiring less effort to make himself understood.

IN COMMUNICABLE DISEASES

Equipment

special tray set with
- sputum cup or kidney basin
- covered medicine cup with warm antiseptic mouth wash
- Dobell's solution in atomizer
- albolene in nasal atomizer
- small jar of cold cream
- absorbent cotton swabs on applicators
- absorbent cotton swab on wooden throat stick
- squares of linen or muslin, 2 × 2 inches
- toilet paper
- small paper bag
- dressing towel

This tray is kept at the bedside.

Procedure

The patient's mouth is cleansed every three or four hours, according to its condition; as a rule, before feeding, otherwise it should be rinsed after food is taken. It may be added that if the fluid intake is sufficient, the possibility of a dry mouth is lessened.

In all special cases a gown is worn by the nurse, and in typhoid and venereal diseases, gloves also. The routine of cleansing the mouth, care of equipment, and care of the nurse's hands is the same in all these cases.

Pin the paper bag to the mattress. Line the bottom of the kidney basin with several layers of toilet paper. Fold back the upper bed clothing from the patient's neck. Double the dressing towel and place it under his chin cornerwise. Cleanse the upper and lower teeth, back and front, including the gums, with swabs dipped in antiseptic mouth wash. The same swab is not used twice; it is discarded into the kidney basin and a fresh one used. If he is able, the patient rinses his mouth with the solution.

Cleanse the tongue with the throat stick swab wet with the mouth wash; use its edges for gentle removal of coated surface, avoiding irritation of the tongue. When through, break the throat stick and place in kidney basin. Wrap all in the toilet paper and place in paper bag.

The Dobell's spray follows. First, test the atomizer, then direct its tip toward the patient's open mouth without touching it and quickly and thoroughly spray all parts. In cases when it is difficult for the patient to hold his mouth open, a gag may be necessary.

After the Dobell spray, the patient may desire to clear the mouth, in which case the sputum box or kidney basin is used.

If the tongue is dry and cracked, with a medicine dropper apply a few drops of olive oil or albolene, or place a pellet of cocoa butter on the tongue, which, as it melts, will serve as a good emollient. Spray the nostrils with albolene or use swabs dipped in olive or cottonseed oil, to soften the dried nasal secretions.

Finally, wrap a small muslin square about the tip of the index finger and daub and smear the lips thickly with cold cream. Discard muslin into paper bag.

After care of equipment

Remove gloves and place on tray. Wash hands if they have been in contact with outside of gloves. Remove gown in the usual way and hang, inside in, on the screen hook. Cover tray with dressing towel and carry to lavatory.

If paper sputum cup is used, empty into hopper and place in special paper bag to be burned. If kidney basin is used, empty and rinse into hopper and sterilize; also the medicine cup.

Should the atomizer tips come in direct contact with the patient when using, they should be sterilized; otherwise washing the tip and outside of each atomizer with soap and water will be sufficient. Wipe off cold cream jar with washed gauze. Place the small paper bag of discarded materials in the larger special paper bag. Place dressing towel in special laundry bag.

The rubber gloves are sterilized once a day; at other times, wash in hot suds and keep in basin of corrosive sublimate, 1–5000.

Wash the tray in hot suds, and dry. After the hands are cleansed, set up the tray again. Cover with clean towel and return to bedside ready for use again.

Care of nurse's hands

Scrub each hand two minutes, including cleansing of finger nails. Apply quinceseed lotion, as frequent washing is irritating to the skin.

IN PNEUMONIA

The mouth is cleansed every four hours. As an emollient for the tongue, albolene or white vaseline in a tube is used.

Deftness on the part of the nurse is desirable in this operation, as any interference with the patient's breathing causes distress.

XLIV

STOMACH IRRIGATION

Purpose

The stomach is irrigated or washed out to relieve persistent vomiting; in acute dilatation of the stomach; and as an emergency measure in getting rid of the stomach contents in poisoning or alcoholism.

Equipment

large rubber sheet or newspapers for floor
rubber apron
cotton sheet
half sheet and rubber, if a bed patient
round basin
foot tub or pail
large tray, set with the following articles:
- 2 half-gallon pitchers with water, temperature 100°–105° F.
- large stomach tube, usually one with the bulb and funnel attachment, buried in a basin of cracked ice
- kidney basin for salivation or vomiting
- gag, used in cases when the patient may bite down on tube
- dressing towel
- washed gauze wipes folded ready for use

When a stomach irrigation is anticipated in the morning before breakfast, the stomach tube is put in

a basin of finely cracked ice and placed in the refrigerator several hours before it is needed. Thus, the rubber tube is kept firm and cold and is more easily passed by the doctor, and more readily swallowed by the patient. In emergency, such preparation must be omitted.

Procedure

This operation is usually carried on in an ante-room; if at the patient's bedside, it should be thoroughly screened. Under ordinary conditions the doctor prefers to have the patient sit up in a chair. A comfortable armchair is placed in position; before it on the floor is spread the large rubber sheet. The foot tub is placed on the rubber sheet beside the chair. At the right side of the chair is a table, upon which is placed the tray with the pitchers of water covered by a towel. On the shelf beneath is placed the remainder of the equipment.

Preparation of patient

If the patient is able to sit up, he is dressed in gown, slippers, and stockings. False teeth on a plate are removed. The patient is seated in the armchair, and his clothing protected with a soft rubber apron, over that a cotton sheet folded and pinned at the back of the neck. For comfort a pillow is placed behind his back. The patient is given gauze to use in case of salivation in passing the tube.

Passing the stomach tube

Except in emergency, to insure coöperation on the part of the patient, especially if the experience be new,

he should receive instruction in regard to breathing and swallowing, also reassurance and encouragement during the operation.

There are different methods used in passing the tube. To facilitate introduction into the esophagus the patient is asked to sit erect with head slightly thrown back. The doctor stands at the patient's right, steadying his head with the left hand, while with the other hand the end of the tube is introduced, following the curve of the roof of the mouth, above the tongue over the glottis and into the esophagus behind.

As the tube is being pushed in, the patient is encouraged to keep swallowing until the marker on the tube has reached his teeth, which allows an extension of 18–20 inches from the lips through the esophagus to the stomach. If any trouble is experienced in passing the tube, the patient is made to lean forward as far as possible. This position renders the gullet almost horizontal, and also enables the patient to swallow more effectively. After the tube has reached the stomach the patient may sit upright again.

The irrigating solution, usually water, is poured slowly into the funnel by the nurse—about a pint, or two funnels full. The funnel is inverted over the tub and the stomach contents either siphoned out, if a straight tube, or withdrawn by suction, but the tube is never entirely emptied until the operation is over. The irrigation is done several times. If the water is not readily siphoned, the patient is instructed to tighten the abdominal muscles by "straining."

Bicarbonate of soda is sometimes added to the water.

In a case of poisoning or alcoholism, the irrigation is repeated until the water returns perfectly clear. In case of poisoning, a neutralizing agent is poured into the stomach through the tube; in alcoholism, usually a dose of magnesium sulphate solution.

Completion of operation

The tube is pinched and quickly withdrawn to avoid danger of its contents getting into the trachea. The patient's face is wiped with gauze, which is placed in the round basin. The patient should be given an opportunity to rinse his mouth.

The sheet and rubber apron are removed and the patient is helped to bed, or allowed to recline in a comfortable chair, if not a bed patient.

Care of equipment

The stomach tube is washed in cold water inside and out until free of mucus, then washed in soapy water, rinsed in clear tepid water, wrapped in gauze, and placed in boiling water. Sterilize for three minutes under supervision, as too long boiling will soften the rubber and injure it.

On removal from the sterilizer the gauze enveloping the tube is removed, the latter is drained and dried with a clean towel, and finally placed in a long, narrow, cotton bag which is tied about the neck of the protecting funnel and kept straight by hanging, as a kink in the tube would interfere with its future use.

All utensils are washed and dried.

Observations

The doctor usually makes his own observations as the stomach tube is emptied and at that time secures a specimen if he desires it.

Sometimes the presence of old blood is observed, in the form of "coffee grounds," or new blood, mucus, and undigested food.

Occasionally the chemical reaction is taken with litmus paper.

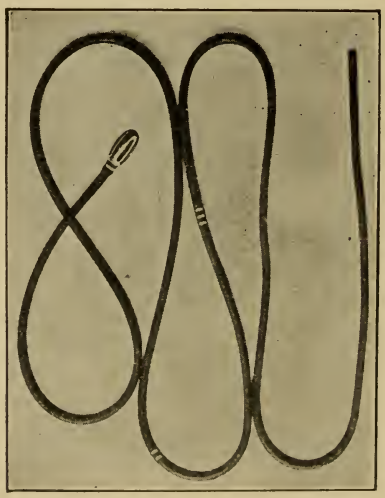
XLV

GASTRIC ANALYSIS

Gastric analysis consists in the withdrawal of the stomach contents by means of a tube before and after a test meal, for study of the stomach secretions and to aid in diagnosis.

The Rehfuss tube

This is a rubber tube especially devised by Dr. Martin E. Rehfuss, of Philadelphia, for aspiration of the stomach and duodenum. It is about three feet in length and one-eighth of an inch in diameter. Attached to



REHFUSS TUBE

one end is a small, smooth metal tip about the size and shape of an olive pit, perforated by openings to permit the drainage of the gastric contents into the tube while in the stomach. The other end of the tube permits the introduction of the tip of a 30 cc. syringe. For guidance the distances are marked on the tube to indicate when it reaches the cardia or upper orifice of the stomach, the pylorus, and the duodenum.

The tube is chilled by placing it in a basin between layers of cracked ice several hours before it is needed. If it is to be used in the early morning, the night nurse attends to this duty.

Equipment

rubber apron and sheet
washed gauze wipes
dressing towel
kidney basin
30 cc. syringe
Rehfuss tube coiled in basin of ice
2 wide-mouthed specimen bottles marked with the patient's name, ward, service, and date. No. 1 labeled, "Fasting contents"; No. 2, "Test meal."

Preparation of the patient

All fluids and food are withheld from the patient from 12 midnight until after removal of the fasting contents of the stomach, usually about 7 A.M. The procedure may be carried out in bed if the patient is too sick to sit in a chair. Otherwise, if able, he is

dressed in a gown, slippers, and stockings and seated upright in a comfortable armchair. The clothing is protected with the rubber apron, and over that the sheet is draped and the dressing towel tucked in about his neck. False teeth on a plate should be removed.

Procedure

As it is important to gain the coöperation of the patient in this procedure, careful instruction is given by the doctor as to what is to be done, and the reason for the operation. The patient is instructed how to breathe, and is assured that as soon as the tube passes the throat, the worst is over.

The Rehfuss tube is removed from the basin of ice by the doctor, who stands at the patient's right and slightly behind him, when the patient is instructed to throw back his head and open his mouth widely. The tip of the tube is placed on the back of the patient's tongue. He says, "Ah," and the tube is quickly thrust into the posterior pharynx. The first convulsive swallow carries it past the thyroid cartilage. With his fingers near the patient's lips, the doctor continually feeds the tube into the mouth with enough slack for the patient to swallow on. The patient is then instructed to breathe deeply through the mouth, swallowing occasionally. The tube usually passes down readily. Some retching may occur as the tube passes through the cardiac end of the stomach. With a few extra swallows the tube is in the stomach.

The 30 cc. syringe is introduced into the exposed end of the tube, and the fasting contents of the stomach

are withdrawn and put into the specimen bottle, which is labeled "Fasting contents." The total fasting contents are desired. When they are obtained, the syringe

REHFUSS TUBE IN POSITION FOLLOWING WITHDRAWAL OF FASTING CONTENTS

is disconnected and the tube is left in position, the exposed end being secured to the side of the patient's mouth or cheek, out of the way, with a strip of adhesive tape. The test meal is now given.

If the patient salivates freely, he is instructed not to swallow, but to use the gauze wipes or kidney basin, as swallowing the saliva, which is alkaline, may interfere with the chemical reaction of the analysis.

The test meal

The Ewald test meal is used to study gastric secretion and motility after the injection of food. This meal consists of a slice of bread with the crust removed,

WITHDRAWAL OF TEST MEAL

and a full glass of water. The patient is told not to drink the water all at once, but to eat and drink so that the bread will be thoroughly softened before swallowing. As a rule it is best for the nurse to feed the patient slowly.

Forty-five minutes later the test meal is withdrawn into specimen bottle No. 2, labeled "Test Meal," and

complete evacuation of the stomach is done by shifting the level of the tip several times before removing the tube.

Following the collection of the test meal the tube is withdrawn. The patient's mouth is wiped and rinsed. The sheet and apron are removed and the patient is allowed to rest.

Examination

Both fasting contents of the stomach and test meal results are examined. In addition to the pathological findings, the total amount, gross appearance, color, odor, and amount of sediment are recorded.

The pathological findings consist of an excess of pus, the presence of red cells, food residue, such as starch, etc., abnormal acidity, and the presence or absence of lactic acid.

After care of tube

The Rehfuss tube is washed inside and out with cold water. The opening of the tube being so small, it will be necessary to inject the water forcibly through the tube with a syringe. Wash in hot suds, rinse in tepid water, wrap in gauze, and place in boiling water to sterilize for three minutes. Remove, drain and dry thoroughly.

XLVI

DUODENAL DRAINAGE

Purpose

To secure bile from the duodenum and biliary passages for microscopic and chemical analysis; and for daily drainage in cases of catarrhal jaundice until infection subsides.

Equipment

tray, containing
- glass basin with Rehfuss tube in ice
- 30 cc. syringe
- 2 specimen flasks for collecting bile
- glass with one ounce of saturated solution magnesium sulphate
- kidney basin
- washed gauze wipes
- dressing towel

Procedure

With the patient sitting up in bed, the Rehfuss tube is introduced into the stomach about 18–20 inches. This is usually accomplished in three minutes and is aided by small sips of ice water. The patient now lies on his right side to enable more ready access of the tube through the pyloric valve into the duodenum, and swallows about seven inches or more of the tube during a period of about twenty minutes, until it reaches the

duodenum. This is a tedious process and may take from thirty minutes to one hour, sometimes longer, much depending on the type and mental attitude of the patient, and the manner in which the operation has been carried out.

The position of the tube is checked by fluoroscope. Magnesium sulphate solution is then injected through the Rehfuss tube with the syringe, and dilates the sphincter of the common bile duct and stimulates the flow of bile in about three to five minutes. The duodenal contents are collected by siphonage. First there is a slight flow of light colored bile, then a larger flow of dark colored bile.

The specimen is examined for pus, bile pigments, and the presence of abnormal cellular or crystalline elements.

XLVII

METHODS OF ARTIFICIAL FEEDING

GAVAGE

Gavage is the introduction of liquid food directly into the stomach by means of a rubber tube passed through the mouth or nose into the pharynx.

Purpose

This method of feeding is used because the patient for some reason cannot take food in the normal way, or objects to it. The latter condition is met in special mental types and delirious patients who cannot be persuaded to eat, having delusions about food itself or the partaking of it; and in children who refuse feedings.

Nature of diet

Liquid food of high caloric value is selected, as far as possible, at the same time offering the variety of a well-balanced diet, such as egg nog, milk, malted milk, cream, broths, strained vegetable soup, purées—especially tomato, beef juice, gruels, or strained cereals thinned with milk.

An example follows of a recipe for one feeding given twice a day to an adult mental patient to supplement insufficient intake of food in the ordinary way:

Egg Nog

2 raw eggs	1 teaspoon malted milk
2 glasses of milk	2 teaspoons sugar or lactose

Salt, strain, and warm to 102° F.

ORAL GAVAGE

Equipment for adult feeding

half sheet and rubber dressing towel	pint pitcher with feeding standing in warm water
washed gauze	cup of sterile water
stomach tube on ice	wooden gag
covered graduate or	

If the patient sits up, a comfortable armchair should be used, the patient being dressed in a warm wrapper or blankets.

Procedure

The procedure is the same as that of introducing the stomach tube in irrigation of the stomach, watching the patient's color and respiration, in case the tube should accidentally get into the trachea. As a test, a little sterile water is slowly poured into the tube, and if the patient's color is good and he is breathing comfortably, before the water has quite run out, the funnel is filled with the feeding, which is allowed to run slowly into the stomach. The operation is completed by following the feeding with more water, which cleanses the tube before removal. The tube is pinched, and removed quickly as its tip passes over the trachea.

In cases where there is danger of regurgitation or vomiting, the patient is put to bed, and kept quiet.

Equipment for feeding child

tray with
- kidney basin
- small glass of albolene
- catheter in cracked ice with funnel attached or a 30 c.c. syringe if the caliber of the catheter is quite small
- graduate with feeding at 90°–100° F. in a pitcher of hot water
- small pitcher of sterile water
- throat stick or handle of spoon covered with gauze to serve as a gag if needed
- small blanket
- dressing towel or bib
- rubber apron for the nurse

Procedure

It is essential that struggling be absolutely prevented or gavage is nearly impossible.

If the patient is a child of three years, or older, keep flat in bed and wrap in a blanket securely from shoulders to feet. Apply dressing towel as a bib. Use gag to prevent biting the tube.

If the patient is an infant, place the arms at the sides, wrap in a blanket, and put on bib. One nurse sits on a low chair, supporting the infant's body against herself and holding the head with both hands, across the forehead, with the head tipped back slightly.

The second nurse lubricates the catheter in the glass of albolene and introduces it as in the case of the stomach tube, observing that the catheter does not coil

in the back of the mouth and that it is 6 or 8 inches below the pharynx.

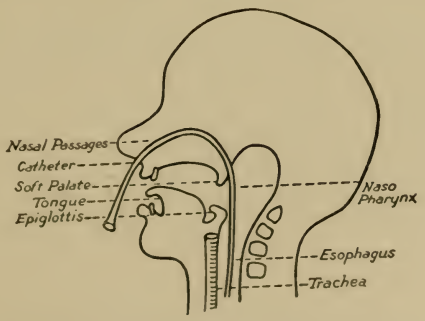
A little sterile water is first allowed to run through the catheter, and if the child is breathing normally, the feeding is slowly introduced. A hemostat may be used to snap the catheter, to keep out the air during the process of refilling the syringe. Throughout the procedure it is important that the patient be kept as quiet as possible, otherwise the feeding may be forced back into the catheter.

The catheter should be removed deftly, as in the case of adult feeding.

The catheter is cleansed by forcibly injecting cold water, then a warm 2% boric solution through it, with a syringe; finally placing in boiling water and allowing it to sterilize three minutes. Remove, dry with sterile gauze, and place in sterile towel, ready for use again.

NASAL GAVAGE

In nasal gavage the catheter is directed through the nasal passages into the naso-pharynx, and into the esophagus.



POSITION OF CATHETER IN NASAL GAVAGE

The size of the catheter varies according to age or to difference in size of the nasal cavities, because of possible deformities of the septum or large turbinate bones which may obstruct.

When gavage is continued for some time, the catheter is passed through one nostril, and then the other, alternating, because this operation is likely to be irritating to the sensitive mucous membrane at the back of the nose. In some cases, to avoid this, the catheter has been allowed to remain permanently in the nose. The end is then looped over the ear to keep it out of the way. Under these circumstances children should wear restraining cuffs to prevent them from pulling out the catheter.

Indications for feeding in this way are the same as those for oral gavage. Nasal gavage is considered more satisfactory by some doctors because of the greater ease of introduction and manipulation, because it is less disturbing to the patient, because there is less danger of vomiting, and this treatment is safer in the hands of a nurse.

This method of feeding is most commonly used for children and infants. Extreme gentleness and deftness are important. In the hands of an unskillful operator any bungling in passing the catheter is sure to cause unnecessary pain, frighten and excite the patient, provoke struggling and resistance, which should be absolutely prevented or gavage is nearly impossible.

Feeding

The amount and frequency of feeding vary according to the age of the child and the condition of health. A

child eighteen months of age may be given a feeding of 8 ounces every four hours, or about 1,000 calories a day. To a child eight years old the following order has been given every four hours:

egg, one — milk sufficient to make
lactose, 1 or 2 drams — 8 ounces

Any liquid food in concentrated form may be given, and in order to raise caloric value, lactose, cod liver oil, or cream is sometimes added to the feeding without causing regurgitation.

Foods are avoided which are irritating to the mucous lining of the nose.

Equipment

For a child

pitcher of hot water in which stands bottle with feeding at 90°–100° F.
small pitcher of warm sterile water
rubber catheter, connecting tube and funnel in the utensil in which they were sterilized
small glass of albolene or olive oil
absorbent cotton swabs
small blanket
dressing towel or bib

For an adult, the equipment is the same as in oral gavage, except that a rubber catheter, connecting tube, and small funnel are used in place of the stomach tube.

Procedure

As in oral gavage, if a small child or infant, his arms are placed down at the sides and the body from shoul-

der to feet is wrapped in a small blanket applied cornerwise. The patient is then propped up in his cot against pillows, and bib and dressing towel are placed under his chin.

The nostril is gently swabbed with albolene and the catheter also well lubricated. The nurse standing at the patient's right, with one hand grasps the back of his head and inclines it forward, as with the other hand she passes the catheter into the nostril slightly upward towards the partition separating the nostrils or septum and directly backward into the esophagus, about ten inches, watching closely for any signs of its entrance into the larynx. Were the catheter in the larynx or trachea when the feeding was poured in, quick death from asphyxiation would follow, or septic pneumonia would probably result from the inhalation into the bronchi of any part of the feeding. In order to know that the catheter is in the right position, a teaspoonful or less of sterile water is allowed to trickle into the funnel. If the patient starts coughing violently, is cyanosed, and the sound of air can be heard rattling in the catheter, it should be at once withdrawn and a fresh start made. If the patient's color is good, and he is breathing easily, one need not be apprehensive. When one has made sure by looking, or by the sense of touch, that the catheter has not doubled on itself in the patient's mouth, the feeding may be started, pouring a little at a time into the funnel at first, allowing it to run slowly into the stomach. Before withdrawing the tubing, another dash of sterile water is poured into the catheter and the catheter pinched and quickly withdrawn.

In order to insure retention of the feeding, the patient should be kept as quiet as possible. If an infant, he remains propped up in bed as long as comfortable. Nasal gavage is sometimes done by placing the infant on its side across the nurse's knees, where it is fed through the uppermost nostril.

The routine in after care of the materials is the same as that of oral gavage.

XLVIII

METHODS OF ARTIFICIAL FEEDING
Continued

RECTAL FEEDING

This method of feeding is employed as an extreme measure when the patient is taking no food or insufficient nourishment by mouth:

To tide over a temporary physical crisis.

To give the stomach rest following gastric hemorrhages.

In persistent vomiting and acidosis of diabetes mellitus.

In states of unconsciousness or coma, as in lethargic encephalitis.

In cases of obstruction between the mouth and gastro-intestinal tract.

In mental diseases attended by dread of taking food (sitophobia).

Food ingredients

It is the function of the large intestine to absorb and to get rid of waste left over from digestion, not to carry on active digestion. The ingredients used in compounding a nutritive enema are necessarily of concentrated food value so as to afford small bulk of a non-irritating nature and as easy of absorption as possible; accordingly it is necessary to predigest some of the food used in enemata.

The ingredients usually prescribed in the formulæ of nutritive enemata are peptonized milk, skimmed milk, beef juice, egg albumin, and saline solution. Occasionally, when greater density is desired, barley water or thin flour gruel is used. As the caloric content of a nutritive enema is low, glucose syrup is added to raise the food value, or it may be combined with the saline solution, alone. Saline solution, which is always used, provides the necessary salt, acts as a diluent, and aids absorption.

Formulae

In all cases the ingredients are to be mixed thoroughly.

I.

peptonized milk, 2 ounces
saline solution, 0.6%, 2 ounces
beef juice, 1 ounce
white of one egg
brandy, ½ ounce
tincture of opium, 10 minims, prescribed if enema is not well retained

II.

glucose syrup, 5%, 3 ounces
saline solution, 0.6%, 4 ounces
strained white of 2 eggs

III. (By Ewald)

wheat flour, 2 tablespoons
mix with warm milk or water, 5 ounces
1 egg and a pinch of salt added slowly while stirring
the whole mixed with 1½ ounces glucose, 15%

IV.

glucose syrup, 5%, 1 ounce
normal saline solution, 6 ounces
alcohol, 50%, 1 ounce

If not retained, the tincture of opium is sometimes prescribed for each second or every other enema for the first two days.

This enema is sometimes prescribed in inoperable carcinoma of the stomach.

Peptonizing milk

tea cup or graduate	thermometer
quart glass jar	milk
saucepan	peptonizing tubes

Each tube contains five grains of pancreatin and fifteen grains of bicarbonate of soda. The contents of one tube will peptonize one pint of milk.

By the action of the pancreatin in the presence of moderate heat and in an alkaline medium (the soda), the process of artificial digestion takes place, and will continue as long as the heating of the milk is kept up.

Empty one tube into a clean glass jar. Add four ounces of cold water and shake. Add a pint of milk and shake again thoroughly. Place the jar in the saucepan of hot water and keep at 115° F. for one hour, when it will be ready for use. Place on ice at once when through. A fresh supply should be made every 24 hours.

Equipment for compounding a nutritive enema

clean surgical gauze, ¼ yard, for straining egg albumin
pint graduate
ounce graduate
dessert spoon
enameled basin
pitcher of hot water
dairy thermometer
ingredients for the prescribed formula

Method of compounding Formula I.

Into the clean graduate measure the warm peptonized milk. Use warm water in converting the stock saline solution to 0.6%. The beef juice follows.

To avoid getting air into the white of egg, it is strained through gauze which has been moistened in cold water and placed on the top of the graduate. A spoon is used to stir the egg albumin through the meshes of the gauze.

The contents of the graduate are stirred and it is placed in the pitcher of hot water until the temperature is raised to 105° F. The graduate is then removed and placed in the basin, when the brandy and tincture of opium are added, the whole mixed, the utensils covered and taken to the bedside with the solutions for the rectal irrigation, if it is due.

The remainder of the equipment, blanket, etc., is the same as that for any other enema.

Procedure

Routine care of the colon

If the nutritive enema is made up largely of proteins, some unabsorbed residue may be left over, which de-

composes and ferments, causing irritation of the mucosa of the bowel. This may start a colitis and resultant inability on the part of the patient to retain the enema. To prevent this, a routine cleansing of the colon is carried on before each feeding, as follows:

One hour before the first nutritive enema one pint of ivory or castile suds is given (avoid the use of harsh soaps). When the feedings consist only of glucose syrup and saline solution, the suds enema will suffice, as the saline solution and glucose are quickly utilized by the tissues, leaving no residue.

Immediately preceding the subsequent feedings with other formulæ a rectal irrigation is done, using either a pint of normal saline solution, 2% boric solution, or a weak solution of bicarbonate of soda, *i.e.*, a level teaspoon to a pint of water at 105° F. The rectal tube is lubricated and inserted in the usual way, and half of the solution is slowly poured into the funnel, then siphoned out, except a little which is left in the tubing to prevent entrance of air.

Giving the nutritive enema

The preceding operation is repeated with the remaining solution, and without removing the rectal tube the nutritive enema is given by allowing it to trickle slowly down the sides of the funnel, which will allow the escape of air, or by filling the funnel with the nutrient and pinching the tubing to retard its progress. To insure retention, it should take ten minutes by the clock to give the feeding. The patient should retain it three hours because of the slow absorption of proteins in the colon.

Aids to retention

An empty bladder before the feeding is begun.

Avoidance of too large a rectal tube.

Pressure against the anal region with a pad or towel.

Elevation of the pelvis on a pillow or on a padded douche pan, with the patient's head lowered.

Elevation of the foot of the bed.

If suffering from tenesmus, warm applications of hamamelis may give relief. Cleanliness of the anal region is an important factor in avoiding tenesmus, since it may be due to irritation from decomposing food or from the salt solution. The part should be gently sponged off after each feeding without disturbing the patient, as quiet is necessary to retention.

Instead of the tincture of opium, an opium suppository may be prescribed.

Method of giving a rectal suppository

Lubricate the suppository. Wrap loosely in toilet paper, place within the folds of a hopper towel, and carry to bedside.

Place the patient in the lateral position.

The nurse draws a finger cot over her index finger; a finger of a discarded rubber glove will serve.

The suppository is held between the thumb and index finger and is inserted and pushed beyond the internal sphincter muscle with the tip of the finger.

Pressure is made against the anus with the towel for a moment to insure retention.

After care of utensils

The rectal tube, tubing, and funnel are washed in cold water, then in hot soapsuds, rinsed off and placed in a covered basin of warm water, and sterilized for five minutes.

This equipment should not be used for any other purpose than nutritive enemata. The other materials are cared for in the usual way, as instructed in the operation of a purgative enema, page 152.

Suggestions

The patient's mouth should be swabbed frequently and rinsed with water when he is not taking nourishment by mouth.

It is important that the nurse's hands and utensils should be thoroughly clean in preparing the feeding.

XLIX

CISTERN AND LUMBAR PUNCTURE

CISTERN PUNCTURE

Purpose

A cistern puncture is the injection of a needle into the *cisterna magna,* the large reservoir of the cerebro-spinal space at the base of the brain, for the following purposes:

In conjunction with lumbar puncture to diagnosticate spinal sub-arachnoid block.

Combined with lumbar puncture, for irrigation of the sub-arachnoid space.

As a route for serum injection.

Equipment

manometer, an instrument with a scale for determining the pressure of fluids

lumbar puncture needles with stylets fitted

10 c.c. graduate, or test tubes marked 1 and 2

novocaine, 1%, and sterile 2 c.c. syringe

iodine

collodion (flexible)

3 or 4 sterile towels

2 packages sterile sponges

Preparation of patient

An area 3 inches wide on the back of the neck up to the external occipital protuberance is shaved and

painted with tincture of iodine. Sterile towels are draped about the site of operation.

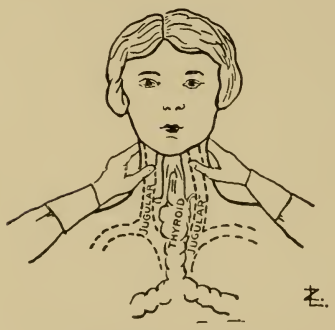
The patient is placed on his side, the head resting on a small pillow, with neck moderately flexed. Care is taken to maintain alignment to vertebral column and to prevent scoliosis or torsion. In cases where comparative readings are important the cistern and lumbar needles are on the same horizontal plane, with manometers attached.

Procedure

By the doctor

The skin at the site of operation is infiltrated with the novocaine.

The thumb is placed on the spine of the axis and the needle inserted in the midline, just above the thumb. It pierces the dura into the *cisterna magna,* from which cerebro-spinal fluid is obtained. The needle is usually inserted 4–5 c.m., 3 c.m. and 6 c.m. being the extremes.



METHOD OF COMPRESSING JUGULAR VEINS

By the nurse

The nurse has the test tubes ready for the reception of fluid. To raise the spinal fluid the nurse may be asked to make pressure on the carotid arteries. The pro-

cedure is simple, the thumbs are placed on each side of the larynx and gently forced backward toward the spine until the beating of the carotid artery on each side is felt. The patient experiences a sensation of fullness in the head, due to increased intracranial pressure, which is visible by a rise in the spinal fluid manometer. Care must be taken not to interfere with respiration, both for the comfort of the patient and the reliability of this test.

LUMBAR PUNCTURE

Lumbar puncture consists in tapping the spinal canal in the lumbar region with a hollow needle.

Purpose

To obtain spinal fluid for immediate diagnosis or for study.

To relieve excessive intracranial pressure.

For the administration of sera and drugs.

Equipment

tray on which are

3 sterile towels

2 packages sterile sponges

adhesive plaster or bottle of flexible collodion

3 finger bowls containing

(1) soapy solution

(2) sterile water

(3) corrosive sublimate 1–2000 or corrosive alcohol

receptacle with absorbent cotton in bottom, containing 3 sterile test tubes labelled 1, 2, 3

novocaine, 1%, and sterile 2 c.c. syringe
glass manometer and its attachments to test the spinal fluid pressure
half sheet and rubber, and 1 or 2 small blankets
30 c.c. glass syringe

If serum is to be given, the tube containing it is placed in a glass of water at 104° F. to warm.

The lumbar puncture needles and manometer are added to the equipment by the doctor.

Preparation of patient

Slip half sheet and rubber under the patient, part under the sacrum and the remainder hanging on the edge of the bed. Arrange the nightgown securely about the shoulders, quite out of the way, and drape with small shoulder blankets, permitting the full exposure of the spine in the lumbar and sacral regions, including the crest of the ilium.

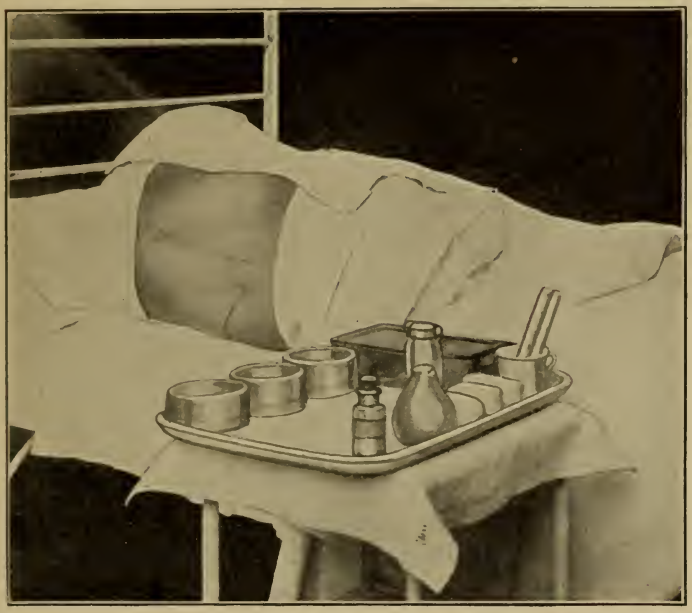
Local preparation of the skin

The technic of this procedure should be carried out as thoroughly as any aseptic surgical operation. Scrub the patient's back with soapy solution, sterile water and corrosive sublimate, from the beginning of the lumbar curve, down to the upper sacral, and well beyond the crest of the ilium. Drape above and below the site of operation with sterile towels. The puncture is usually made between the fourth and fifth lumbar vertebræ.

Position of the patient

The patient is on the left side as a rule, with hips near edge of bed or table, knees drawn up as high as

possible, so that the thighs are flexed against the abdomen, hands lightly clasped about the knees, head bent down towards the knees, so as to obtain the maximum



PATIENT PREPARED FOR LUMBAR PUNCTURE

bowing of the spine, to aid in the successful introduction of the needle between the separated vertebral spaces into the spinal canal. The position of the patient is most important, and will often determine success or failure. The most valuable aid the nurse can give the doctor is to reassure the patient and to see that this position is maintained. The nurse should, in a difficult

puncture, put one arm about the patient's neck, and the other about his knees, while on the opposite side of the bed from the doctor, in order to bring the head and knees of the patient still nearer. It will often make possible a puncture otherwise most difficult, especially in the case of a child.

Procedure

The novocaine is used as in cistern puncture.

When the needle is inserted and the manometer reading has been taken, the test tubes are presented in the order of their numbers and the manometer is tipped down so that the fluid flows out of the top into the test tube. This, when filled, is placed in upright position in the receptacle provided. After each withdrawal of fluid, the manometer reading is noted by the doctor and mentioned to the nurse (this provides a check on his memory), and the next tube in number is presented. When the operation is completed and the needle withdrawn, a sterile sponge is applied, and held in place with a strip of adhesive plaster or a collodion dressing.

After care

Following a lumbar puncture, the patient should be carefully observed. If he should complain of headache, the doctor should be informed, when he may prescribe ten grain doses of aspirin, given in hourly periods, for three doses. This medication will usually relieve the patient's headache.

In order to aid gravitation of the spinal fluid to the

brain, unless the doctor requests otherwise, the patient should always be kept flat, without pillows, for six hours. In some cases a four hourly chart is kept for a day or two, for purposes of observation.

L

PARACENTESIS

THORACENTESIS

Thoracentesis, or chest tapping, is the act of puncturing the chest wall with a long hollow needle or trocar for the purpose of exploration, for diagnosis, or for the evacuation of effusions from the pleural cavity.

Equipment

shoulder blanket
adjustable bedside table, if the patient sits up for the operation
half sheet and rubber
dressing tray with 3 glass finger bowls of solutions for cleansing and disinfecting the skin
3 sterile dressing towels
3 packages sterile sponges
1 hemostat
30 c.c. syringe with a small and long needle
2 sterile test tubes in a retainer, with absorbent cotton on the bottom to prevent breaking and to hold them upright, labelled, and bearing name of patient, ward, service, and "chest"
1 clean test tube containing potassium oxalate (about 4 grams), to prevent fluid from clotting, in order to count cells
bottle of flexible collodion
adhesive plaster

novocaine, 2%, and sterile 2 c.c. syringe
hypodermic syringe with caffeine sodium salicylate, usually 5 to 10 grains, in case of sudden respiratory distress

Procedure

Preparation of patient

The nightgown is removed and the shoulder blanket

PATIENT PREPARED FOR ASPIRATION OF CHEST

applied to cover the patient's chest and to leave the back partly exposed from neck to waistline. The half sheet

and rubber are placed upon the bed against the patient's back.

The back is scrubbed, and disinfected on both sides from the anterior axillary line of the side to be tapped to the angle of the opposite shoulder blade, and a sterile towel is draped over the shoulder.

Position

If the patient's condition permits, he sits up in bed, leaning forward with his arms extended upon a pillow on the adjustable bedside table, which is elevated as high as the patient's chest, so that his ribs are lifted and separated.

If the patient is unable to sit up, he is placed on his side, opposite the one to be tapped, near the edge of the bed, with a pillow under his chest to spread the ribs on the upper side. The upper hand is placed on the opposite shoulder and the elbow supported by pillows.

Site of puncture

The place selected by the doctor for the tapping is usually in the sixth, seventh, or eighth intercostal space, generally, directly under the angle of the scapula. The site of puncture, particularly if exploratory for encapsulated empyema, may be anywhere in the pleural cavity. Great care is exercised when regions of the pericardium, or anterior or posterior mediastinum are liable to be encroached upon. The needle is introduced near the upper margin of the lower rib in the intercostal space, since the intercostal artery runs along the lower margin of the ribs, and possibly may be punctured if the upper portion of the space is entered.

A wheal is made in the skin with novocaine and the subcutaneous and intercostal tissues infiltrated on either side. The sterile field is covered with a sterile towel and left on, while ten minutes is allowed for the local anesthetic to take effect.

When it has taken effect, the large needle on the end of the 30 c.c. syringe is slowly inserted between the ribs into the chest cavity, and if successful, 30 c.c. of the fluid is withdrawn. The nurse carefully removes the absorbent cotton plug from the test tube so that it does not come in contact with unsterile surfaces, and holds it to be filled from the syringe or trocar, then plugs the test tube and replaces it in the retainer.

ASPIRATION OF THE CHEST

Equipment and preparation

To the thoracentesis equipment add

special paracentesis or large caliber lumbar puncture needle

3-way stop cock and rubber tubing attachments

5-pint bottle

The same observations are made of the patient's condition as in the first operation. If he is nervous or apprehensive, morphine sulphate, 1/6 grain, is ordered to be given subcutaneously twenty minutes before the operation; and for emergency use, the hypodermic syringe is refilled with caffeine sodium salicylate, 5 to 10 grains, which can be administered intramuscularly should the patient faint or become dyspnœic.

Every effort should be made by the nurse to be matter of fact and keep the patient from becoming

fearful. His respiration should be kept uniform and the movement of the chest decreased as much as possible. Spontaneous coughing should be inhibited by the patient himself or by medication (chloroform lozenges, etc.). Severe pain and coughing are produced when the needle catches in the pleura. This may happen if patient moves or jumps unexpectedly, or sighs, yawns, or coughs.

Procedure

The patient is prepared, as before, in the exploratory puncture. The paracentesis needle is then inserted so as to graze the upper surface of the lower rib and to extend well into the fluid cavity. The needle is then connected to the 3-way stop cock and 30 c.c. syringe, all of which are sterile. Several sterile test tubes can then be filled with the material withdrawn and suitable studies and cultures done. The outlet tube can be connected with a 5-pint bottle and the remaining fluid pumped into it by the syringe. Great care should be taken that air is prevented from entering the pleural cavity.

As a rule the fluid is withdrawn slowly. If the patient coughs while the fluid is being withdrawn, it is usually a sign that the lung which has been pushed up by the pressure of the fluid is coming down on the needle, and in order to avoid injuring the lung, the doctor waits before proceeding again, and if coughing persists, or the patient feels faint, the needle is withdrawn.

The puncture in the skin is covered with a collodion

dressing, or a sterile gauze sponge, held in place with adhesive strips. The patient lies down and is made comfortable and kept quiet. Observations of the pulse are frequently made, faintness and collapse watched for, because of the effect upon the heart and blood pressure, following removal of the effusion. Persistent coughing and raising of sputum are noted, the latter for air bubbles or for blood.

The gross description of the fluid in the bottle is made by the doctor and the amount measured by the nurse and recorded. If the whole amount is not to be saved, 30 c.c. of the fluid is secured for culture and laboratory tests.

PERICARDIAL ASPIRATION

Aspiration of the pericardium is usually an emergency operation and is done where the action of the heart is embarrassed by an excessive effusion of serous fluid within the pericardial sac, causing great distress to the patient because of the sense of pressure and fullness about the heart. For relief, the patient sits forward in bed with his head bent on his hands.

In the preparation of the skin a large area is prepared about the site of operation to permit a clean field for percussion during the withdrawal of the fluid.

Preparation

The preparation and equipment are the same as for pleural tapping, except that the area scrubbed includes the following:

From line of clavicles to line of umbilicus and from right nipple line to left posterior axillary line.

The patient should be on a head rest, with left arm raised, and if it is desired, held in position by the nurse.

ABDOMINAL PARACENTESIS

Abdominal paracentesis, or tapping, is an operation for the removal of ascitic fluid from the abdominal cavity for the purpose of study, diagnosis, or relief of pressure.

Equipment

shoulder blanket
stockings
half sheet and rubber
rubber sheet
blanket and wrapper
bath tub
5-pint bottle
dressing tray on which are 3 sterile test tubes in specimen glass, with cotton at bottom
3 sterile towels
3 packages sterile sponges
3 finger bowls
  (1) soapy solution
  (2) sterile water
  (3) corrosive sublimate, 1–2000
novocaine, 1%, sterile 2 c.c. syringe, and needles
adhesive plaster
sterile trocar and cannula
12-inch piece of rubber tubing to attach to cannula

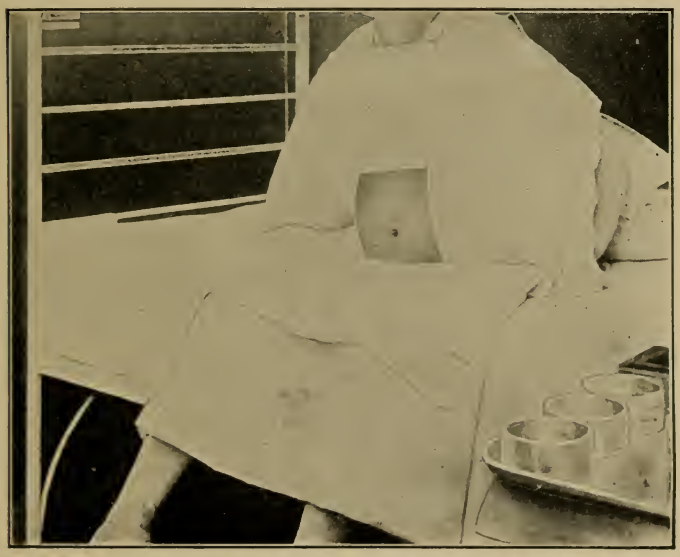
if needed to serve as an extension in draining off the fluid into the 5-pint bottle
sterile scalpel

A small hypodermic needle and a larger intramuscular needle should be provided. All needles and syringes should be tested before sterilization.

Procedure

Preparation of patient

The bladder should be emptied. Put on stockings and wrapper. The patient should be seated in a comfortable armchair, or bolstered up on the side of the



THE PATIENT PREPARED FOR ABDOMINAL PARACENTESIS

bed. If in a chair, support the patient's back with a pillow, and drape the shoulders with a small blanket, leaving the abdomen exposed. Place a half sheet and rubber sheet on the patient's lap, a large rubber sheet on floor, and a large pail and 5-pint bottle within reach.

The patient's abdomen is thoroughly scrubbed by the nurse with soapy water, sterile water and corrosive sublimate (paying special attention to the pelvic region, just below the umbilicus). Sterile towels are draped above and below the area scrubbed.

Operation

The novocaine is employed as usual.

A slight incision is made with the scalpel by the doctor for the introduction of trocar and cannula. On the withdrawal of the trocar the nurse should be ready to catch the first few drops of ascitic fluid in a test tube. If necessary, the rubber tubing is attached to the cannula and the 5-pint bottle is placed in position for the remainder of the fluid.

Completion of operation

The cannula is removed and a sterile sponge and adhesive plaster are put over the wound. If there is much oozing, a large sterile pad and binder are applied.

The amount of fluid obtained is measured and recorded on the laboratory sheet by the doctor.

NOTE: The thorough emptying of bladder cannot be too greatly emphasized in this operation to avoid accidental puncture of the bladder.

LI

PREPARATIONS OF DRUGS AND THEIR MEDICINAL USES

The various forms into which drugs are made ready for use are classed according to legal standards.

LIQUID PREPARATIONS

Aromatic waters are aqueous solutions of volatile substances, such as camphor water, peppermint water.

Infusions are aqueous solutions containing the active principle of a vegetable substance, and are usually made by pouring boiling water on the vegetable substance and allowing it to steep for thirty minutes. Some are made by a cold process. Infusion of digitalis is an example.

Decoctions are aqueous solutions containing the active principle of a vegetable substance and are made by boiling the drug with water from twenty minutes to one hour because of the harder or denser nature of the drug, as decoction of couch-grass. Official in the British Pharmacopœia.

Tinctures are alcoholic, hydro-alcoholic or hydro-alcoholic glycerinated preparations, made by extracting the active principles of a drug by percolation or maceration, or both. The preparation is usually 10% strength. For example, tincture opium, tincture digitalis.

Spirits are alcoholic solutions of volatile substances. For example, spirits of peppermint, spirits of nitre.

Fluid extracts are alcoholic, hydro-alcoholic or hydro-

alcoholic glycerinated preparations, made by extracting the active principles of a drug by percolation, maceration, or both. The preparation is 100% strength; each c.c. representing the activity of 1 gram of drug. For example, fluid extract cascara sagrada.

Elixirs are preparations containing alcohol, water, glycerine, sugar and aromatic oils. They are used entirely as vehicles. For example, aromatic elixir, elixir orange compound.

Mixtures are a class of preparations in which insoluble substances are held in suspension by the aid of gum, syrup or some other viscid substance. For example, compound mixture licorice.

Emulsions are preparations in which oil is held in suspension by the aid of acacia, tragacanth or some other gum. For example, emulsion cod liver oil.

Solutions are preparations made by dissolving non-volatile substances in water or other suitable solvent. For example, solution potash, solution iodide potash.

Glycerites are made by combining medicinal agents with glycerine. For example, glycerite of tannic acid, glycerite of boric acid.

SO-CALLED SOLID PREPARATIONS

Extracts are a class of preparations prepared by exhausting the active principles of a drug in a suitable menstruum and concentrating the product into a powder form or a solid of a pillular consistence. Extract licorice.

Cerates are made by combining a drug with paraffine wax or fats; the idea being to get a preparation that will soften at the temperature of the body but will not

melt, and that is intended to act as a protective, at the same time keeping the medicinal agent in contact with the skin. For example, resin cerate, cerate cantharides.

Ointments are combinations of a fatty nature, containing sometimes lanolin, lard or petrolatum, or a combination of two or more of the above items combined with a medicinal agent. They are usually intended to melt at the temperature of the body. Some are applied by inunction and others are smeared on the skin. For example, mercurial ointment, boracic acid ointment.

Pills are preparations of medicinal substances in spherical or oval shape. They may be coated with sugar, gelatine, gelatine compound, and range in size from 1 to 5 grains. For example, Blaud's pill.

Tablets are usually disc-shaped and contain medicinal agents combined, and are coated with chocolate or sugar. They range in grainage from 2½ to 10 grains. They are of different types, depending on the character of the medicinal agent. There are three kinds of tablets: compressed, triturate and hypodermic. Compressed tablet: compound cathartic. Triturate tablet: rhinitis. Hypodermic tablet: morphine sulphate.

Lozenges are listed in the U. S. Pharmacopœia as **Troches** and are made by combining medicinal agents intended to be dissolved in the mouth in order that the agent may act on the mouth or throat. One of the very common types is that known on the market as the chloroform lozenge; another example is troches of tannic acid.

Suppositories are made by combining a medicinal

agent with cacao butter or with modified boro-glycerine and moulded into the desired shape to suit the orifice for which they are intended.

Capsules are gelatine cases used for the administration of drugs disagreeable to the taste. The gelatine may be of the elastic type or hard. A common type of elastic capsule is the santol oil capsule.

Cachets or **Konseals** are made of starch and are intended to encapsulate medicinal drugs having a very disagreeable taste. In the presence of moisture they collapse to a certain degree and are very easily swallowed.

Ampules are glass containers holding liquid medicinal agents in sterile condition. Commoner kinds are ampules ergot and ampules digifoline solution.

EFFECT, LOCAL AND SYSTEMIC

The therapeutic effect of drugs upon the body may be produced locally, that is, by direct application of a medicine to the part where the action is desired; or systematically, when the required effect is to be produced on a part away from the point of administration.

Locally, drugs may be used on the skin, as by plasters, liniments, counterirritants; or on mucous membranes, as by irrigations and gargles.

For *systemic* or general effects, the methods of giving vary according to the rapidity of action required, and the effect of the drug.

ADMINISTRATION

Channels of administration

Subcutaneous, when the effect of the drug is desired

immediately, for example, caffeine as an emergency stimulant.

Intramuscular, when the drug is irritating to the subcutaneous tissues, as Hayden's solution.

Intravenous, when it is advisable to get the drug directly into the blood stream, as salvarsan.

Intraspinal, to affect the central nervous system, as in the giving of sera, antitoxins or arsphenamine. See Chapter XLIX.

By mouth, as pills, capsules, solutions and powders.

By inhalation, for effect upon the respiratory system, as tincture of benzoin, or amyl nitrite. See Chapter XXXIII.

By rectum, when the drug has a disagreeable odor or taste, such as paraldehyde, or when an intestinal medication is required.

Medicines act more readily and powerfully when given by mouth than when administered by rectum; still more when injected under the skin, and most powerfully when given intravenously.

Conditions that modify dosage

The activity of a drug may be increased or lessened by age, sex, idiosyncrasy, as well as by condition of digestion and ability of absorption, by disease, and by the manner of administration. All of these things should be considered in relation to dosage.

Age. Children and old persons are more readily influenced by most drugs, particularly narcotics, than adults in the prime of life; but as a rule they bear larger proportionate doses of purgatives.

Sex. Men generally bear larger doses of medicines than women.

Idiosyncrasy. Many persons manifest peculiarities with respect to certain drugs. Some are susceptible to the poisonous effects of arsenic or phosphorus. Others cannot tolerate belladonna or iodides. Some are very susceptible to the action of cocaine when applied to the mucous membrane in a very weak solution.

Habitual use. When a medicine is taken over a long period the system becomes tolerant to it, which means that larger doses must be given to get the desired effect. This is especially the case with purgatives and some opiates.

Cumulative effect. Drugs that are rapidly absorbed and slowly eliminated may produce a cumulative effect. This may happen also with patients whose vitality is very low and their power of elimination rather slow.

Toleration. During digestion larger amounts of medicines are borne than can be taken when the stomach is empty. In certain conditions of the alimentary canal, as in cholera, during congestive chill of gastric enteric variety, or during profound opium narcosis, absorption from the stomach is slow, if it takes place at all. In certain diseases great tolerance is manifested to medicines; thus in peritonitis large doses of opium are taken with advantage. In typhoid fever the tolerance to alcohol is marked.

Method of administration

The method modifies the effect to a greater or less degree. The therapeutic action of a drug may be de-

stroyed by the method in which it is prepared and given to the patient. In order to give drugs intelligently, knowledge of their effect is essential to obtain the desired effect. The following points should be remembered when giving drugs by mouth:

Saline cathartics should be given on an empty stomach, preferably before breakfast, because of the short time required for their action. They should be well diluted except in cases of edema, when it is necessary to rid the body tissues of water. They act more powerfully when concentrated.

Other cathartics are given late in the afternoon or evening, depending upon the time required for their action.

Diuretics act more powerfully when diluted.

Oils should never be given directly after meals, as they may interfere with digestion. The taste of castor oil may be disguised by giving it between layers of orange or lemon juice, or by adding a pinch of soda bicarbonate to the mixture at the bedside. Sometimes it may be given in carbonated waters, as Vichy. This breaks up the globules of oil and makes it easier to swallow. Or the taste buds may be dulled by eating cracked ice before the oil is administered.

Pills may be given by placing back on the tongue, or by putting them in bread or jelly, and following by plenty of water to supply the fluid necessary to dissolve the pill and make it ready for absorption.

Powders with disagreeable tastes are given in capsules. Others should be dissolved in hot milk, as veronal, to help its sedative action; or in cold water,

as seidlitz powders. Those which do not dissolve readily in liquids, as compound licorice powder, may be made into a paste and given with a teaspoon, followed by the drinking of water.

Iron and *acids* should be given through glass drinking tubes to prevent destruction of the teeth.

Tonics, which are given to improve the digestion, are best given before meals. They may be diluted, but not enough to disguise their taste, as their action depends upon the bitters which they contain.

Drugs that are irritating to the mucous lining of the stomach should be diluted more than any others, and are best given after meals, when there is food in the stomach, as this tends to lessen the irritation.

Cough mixtures are soothing to already irritated mucous membranes, because of the syrup which they contain, and in this way tend to relieve the spasm of coughing, therefore they should not be diluted. All other liquids may be diluted.

In giving *hypnotics,* the patient should be made comfortable first, and then the drug given early enough to produce sleep at the required time.

Patients who are able should not be permitted to walk to the operating room following their preoperative dose of morphine, but should be kept quiet, as the activity may offset the desired effect of the drug.

Dosage for children

It is often necessary to determine the dose of a drug suitable for children according to their age. This is commonly worked out by Young's rule.

Rule: For children 1 to 12 years of age:

$\frac{\text{Age of child in yrs.}}{\text{age} + 12}$ Reduce this fraction to lowest terms, and take this fractional part of the adult dose.

Example: Adult dose of paregoric is 1 dram. How much would you give to a 4 year old child?

$$\frac{4}{4 + 12} = \frac{4}{16} = \frac{1}{4}$$

Adult dose = 1 dram or 60 minims.

Therefore, $\frac{1}{4}$ of 60 = 15 minims.

Rule: For children under 1 year of age:

$$\frac{\text{Age of child in months}}{150}$$

Example: Adult dose of paregoric is 1 dram. How much would you use for a 5 months' old child?

$$\frac{5}{150} = \frac{1}{30}$$

Adult dose = 1 dram or 60 minims.

Therefore $\frac{1}{30}$ of 60 = 2 minims.

Abbreviations

Written orders for medicines make it necessary for the nurse to understand and interpret correctly the following abbreviations, which are some of those most commonly used and have to do with how and when drugs are to be given:

$\bar{a}$ $\bar{a}$	ana	of each
a. c.	ante cibum	before meals

ad		up to
aq.	aqua	water
b. i. d.	bis in die	twice a day
$\bar{c}$	cum	with
c.c.	centimeter cubicum	cubic centimeter
dr. ʒ	drachma	dram
gm.	gramma	gram
gr.	granum	grain
gtt.	gutta	drop
M.	misce	mix
m.	minimum	minim
o. d.	omni die	daily
oz. $\bar{ʒ}$	uncia	ounce
p. r. n.	pro re nata	whenever necessary
p. c.	post cibum	after meals
p. o.	per os	by mouth
q. h.	quaqua hora	every hour
q. 2h.	quaqua dua hora	every two hours
q. 3h.	quaqua tertia hora	every three hours
q. s.	quantum sufficit	quantity sufficient
s s	semi	one-half
$\bar{s}$	sine	without
s. o. s.	si opus sit.	when occasion arises
stat.	statim	at once
s. c.		subcutaneously
t. i. d.	ter in die	three times a day

Weights and measures

The apothecaries' and metric systems are those which are commonly used in pharmacy for weighing and measuring. The tendency now is more towards the

use of the latter, because it makes possible a common scale for measures of length, weight and capacity, and also because of its simplicity and accuracy in use, as it is a decimal system resembling ours of coinage.

The unit of length is the meter.

The unit of weight is the gram.

The unit of volume is the cubic centimeter.

Any fractional parts of a unit are expressed by the prefixes: deci, which means 1/10 of the whole unit, and is written in metric terms as 0.1; centi, which is 1/100 of a unit, and is written 0.01; and mille, which is 1/1000 of a unit, written 0.001.

To express terms larger than one unit, the prefixes: Deka, meaning ten; Hecto, meaning one hundred; and Kile, meaning one thousand whole units, are used.

By understanding these prefixes, any metric table may be easily formed by using them with any desired unit.

Metric terms are easily remembered and read if it is understood that numbers on the left of a decimal point correspond to dollars or whole units, while those on the right side are read as fractional parts of that dollar. For example, we write $2.75 and read it as two dollars and seventy-five cents. Removing the dollar sign, if the unit were grams, the numbers would be read, two grams and seventy-five centigrams.

Metric terms are always understood to mean grams for solids and cubic centimeters for liquids unless otherwise specified.

Equivalents helpful in working out problems:

1,000 c.c. = 1 quart, approximately

500 c.c. = 1 pint, approximately
4 c.c. = 1 fluid dram, approximately
30 c.c = 1 fluid ounce, approximately
1 grain = 65 milligrams, written decimally 0.065
15 grains = 1 gram, approximately
1 kilo = 2.2 pounds

Problem

To digitalize a patient, 1½ grains for every 10 pounds of body weight is required. How many grams of digitalis will be needed for a patient who weighs 180 pounds?

1 grain = 0.065 milligram
½ grain = 0.033
1½ grains = 0.098 milligram or amount needed for every ten pounds of body weight.

If patient weighs 180 pounds, he therefore will require 18 times 0.098 or 1.764 grams.

The treatment book

This consists of a medication sheet for each patient, upon which are written all orders for treatments under these headings: the date, the order, the date the treatment is omitted, and the house officers' and nurses' comments.

These orders are usually written and signed by the doctor. Verbal or telephone orders may be recorded and signed by the nurse, and in parenthesis below should be included the manner of giving the order, and the nurse's signature. The doctor should then sign this upon his next visit to the ward.

Before giving any medication, a nurse should read carefully and understand the order as written on this sheet, to prevent any mistakes in the nature of the treatment or in the time for giving it.

When carrying out p. r. n. orders, the time at which the treatments were administered should be recorded in the column on "comments."

All p. r. n. orders for morphine are by routine omitted at the end of seventy-two hours, and should never be given after that time, until a new order has been written by the doctor.

At midnight, the night nurse goes through the treatment book, and rules a red line across each page, just below the orders that are written on that day.

Card system

For accuracy in pouring and administering a dose of medicine, small cards of various colors are used. That is, all medicines written on green cards are given three times a day, those on yellow cards are given before meals, those on orange cards are given after meals, while any special medicines which are given at any other times than indicated above are written on white cards.

On each medicine card is written the patient's name in full, the name or number of the drug, the dose, how it is to be given, and at what time.

All cards of the same color are held together by a rubber band. A card is placed on top of each package by the nurse in charge, which tells how many there should be of that color, and the date upon which they

were counted. They are looked over daily, and are kept in a special box for use.

When the medicines are to be poured, the cards are counted to see that none are missing. Then they are spread out on the shelf, and arranged so that the same medicines are grouped together. This saves time in the end, as all medicines of the same kind may be poured at once, which otherwise would necessitate the taking and returning of that bottle to the shelf several times.

After pouring each medicine, the card is placed on top of the cup. When they have been given, the cards are placed on the head nurse's desk, and she, after looking them over, returns them to the medicine box.

Responsibilities of the medicine nurse

The nurse who has had this special duty assigned to her is made responsible for the following:

The care of the medicine closet.

To see that at 7.30 A.M. all empty bottles are put into the apothecary basket which need to be refilled for use that day, with the exception of those which contain alcohol and narcotics. These have to be taken to the apothecary in person.

Drugs which deteriorate and are unfit for use after a certain time are labeled "return to apothecary" and dated. The nurse should see to it that these medicines are returned on the date required. If they are still needed on the ward, write "refill" on labels, and "returned" if they are no longer in use.

All medicines not in use when patients are discharged should be marked and returned also.

All drugs used on the wards which are reportable and come under the Harrison Act, such as opium, cocaine, or their derivatives, should be checked daily on the proper charts, and report made to the head nurse of any that are missing.

See that there are no unlabeled medicines.

Dispensing medicines

Besides the necessary qualification of a sound working knowledge of arithmetic and materia medica, the nurse who dispenses drugs should also have a clear understanding and a strong sense of responsibility toward this important duty, characterized by punctuality, concentration, accuracy, interest and refined habits of cleanliness.

The nurse whose duty it is to dispense the drugs should not be called on to do anything else, or in any way be disturbed, until this duty is completed.

General rules

Start in time, and with clean hands.

Utensils used in dispensing medicines must be surgically clean.

Give the exact dose as prescribed. When minims are ordered, give minims and not drops, as the latter vary with the weight of the solution and the size of dropper used. If there is any uncertainty about the interpretation of the order or the fraction of the dose, take no risk. Consult the one in immediate authority. It is the patient who suffers when an error is made.

In dispensing any drug, read the label three times: on removal from the medicine closet; before pouring or dealing out; and before returning drug to medicine closet.

If a solution, shake the bottle before removal of the cork. Avoid pouring on the label side in all cases.

A patient should never under any circumstances carry a medicine to another patient.

All drugs should be actually administered by the nurse to the patient, and not be allowed to remain at the patient's bedside, to be taken at his own discretion.

Be sure that the right patient receives the right drug. If an error has been made, do not alarm the patient, but report *at once* to the one in authority.

Forgotten doses are reported. The drug ordered by the doctor for his patient to be given at certain hours should be of sufficient importance to be remembered. To the patient such an oversight is annoying and creates in him a critical attitude and loss of confidence in the nurse. In some cases a patient may feel that his recovery has been retarded by the omission of a dose of medicine.

Display interest in the act of giving the medicine. Our behavior towards our patients plays an important part in the psychic influence. It makes a difference whether the dose of medicine is passed to the patient in silence, with an air of languid indifference, or with an alert, sympathetic interest. A dose of medicine is generally of importance to the patient, as one may learn if it has been overlooked.

The medicine closet should be kept locked, and the

key kept in the head nurse's desk. At night the nurse on the ward should carry the key about her person, and remember to return it to its customary place before going off duty in the morning.

Sterilize medicine cups and glasses after use.

Graduates and medicine droppers should be washed in a hot soap solution, rinsed and dried. When drying a minim graduate, screw the corner of the medicine towel firmly into the bottom, so that all sediment may be dislodged.

Equipment for dispensing medicines

pitcher of cold water
medicine cups, glasses or paper drinking cups
ounce graduate
minim graduate
medicine droppers
teaspoons for pills and powders
measuring cup for seidlitz powders
glass stirring rod
glass drinking tubes
moist pieces of gauze for wiping mouths of bottle
medicine towel
medicine cards
hypodermic syringe and needle

Method of pouring liquid preparations

Grasp the bottle on the label side with the right hand, remove the cork with the side of the small finger of the left hand or between the fourth and fifth fingers, with the back of the fingers directed towards the cork. Pour the dose by holding the body of the bottle easily within the grasp of the fingers.

Hold the graduate upright by its base with the left hand so that the scale is in full view when held on the level of the eyes.

Pour slowly into the graduate until the amount needed is indicated by the numbered scale and line when the graduate is held straight. To avoid defacing the bottle, the final drop is caught on the edge of the graduate, or with an upward twist of the mouth of the bottle. The graduate is put down, and as the cork is being replaced, the label of the bottle is read for the third time, and the bottle is replaced in the medicine closet.

In all cases in pouring medicines hold the cork, so that it becomes a habit. If put down, it is apt to roll on the floor, when it is unfit to replace, or it may be lost.

All liquid preparations of drugs should be tightly corked because of the danger of evaporation and deterioration.

LII

SUBCUTANEOUS AND INTRAMUSCULAR INJECTIONS

Subcutaneous injections

A subcutaneous injection is a method of introducing special preparations of drugs directly into the subcutaneous tissue to be absorbed into the circulation. The purpose of this method is to obtain quick and sure action.

The classes of drugs most commonly used are cardiac and respiratory stimulants, narcotics and sedatives and insulin. They are prepared and put up in small effective doses containing the active principle of the drug, in the form of sterile solutions in soluble tablets, or sealed in ampules.

In order to avoid large blood vessels, the points of injection are in the outward exposure of the extremities —as over the triceps muscle or over the deltoid; in a thin person, in the front of the thigh, over the quadriceps, or into the loose connective tissue of the body, beneath the breast or shoulder blade.

In giving insulin, the needle is injected at an accentuated 45° angle, a little deeper than the subcutaneous tissue, but not into the muscle.

Intramuscular injections

This method is usually prescribed for the introduction of irritating drugs directly into a large muscle,

for immediate absorption. A slightly larger and longer needle is used, which is directed almost vertically into the muscle. The point of injection may be the gluteal muscle, at the prominence of the buttock, or in the quadriceps, front of the thigh. Except for the method of introducing the needle, the same routine is carried out as in subcutaneous medication.

Equipment

tray set up with
- drugs in solution and tablet form in fractional doses
- covered glass museum jar with sterile gauze sponges in 70% borated alcohol
- straight forceps in 70% alcohol
- 2 syringes, 1 glass 2 c.c., 1 metal 25 minim, the latter kept in 95% alcohol, with cap removed
- sharp needles to fit, threaded with fine wires
- dessert spoon or needle sterilizer
- bottle of fresh distilled water
- tincture of iodine
- spirit lamp
- box of matches

Metal syringe

The parts of an ordinary syringe are: (1) a barrel, which will hold 25 minims when full, with a short projection on the end; (2) a piston on which is engraved the minim scale; (3) a washer of leather or rubber; and (4) a metal cap. The piston fits snugly into the barrel of the syringe and acts as a propeller in dis-

charging its contents. It is held in place by a band which screws onto the barrel. The washer fits the end of the syringe, securing tightness when the needle is in place, and preventing leakage. The metal cap screws on and covers the open end of the syringe, preventing dust from getting into the barrel.

Procedure

Materials should be in readiness on each ward. The syringe and needle should be in perfect working order, ready for emergencies. The hands should always be washed before beginning, except in emergencies, when time counts.

Removal of sponge from jar

Remove cover from jar and invert on tray. Grasp a sponge with the sterile forceps, squeeze out the alcohol by rolling sponge against the inside of the jar, and place upon the inverted cover.

Preparation of needle

Light spirit lamp. Place needle, without removing the wire, in a clean dessert spoon, with its hilt toward the handle of the spoon. Uncork the bottle of distilled water, cleansing the mouth by letting some of the contents run over its edges, then pour enough over the needle to cover it completely. Boil the water over the flame one minute after the boiling point has been reached. Place spoon on tray with handle supported by the edge. Remove needle with forceps and transfer to the sponge. Remove syringe from glass receptacle and drive out alcohol by moving plunger back and forth,

then fill with sterile water from spoon. Extinguish light.

Preparation of drug

If a tablet, note if the fraction of the dose on the label corresponds with that of the dose ordered. If so, drop the tablet directly from the vial into the sterile spoon, otherwise work out the problem before starting operations. Hold the syringe upright and slowly expel water until the desired amount, as indicated by the scale on the piston, has been reached; fifteen minims is usually sufficient to dissolve the tablet and dilute the drug for ready absorption. Less may interfere with absorption because of the sugar of milk in the tablet. More is apt to cause unnecessary pain from subcutaneous pressure. Empty the syringe over the tablet. Stir with the tip of the syringe until dissolved, then draw up the solution slowly. To avoid charging with air, do not pull the piston beyond the scale of the prescribed amount.

METHOD OF CARRYING SYRINGE TO BEDSIDE

Attachment of needle and final procedures

Without touching the needle, it is picked up by its hilt. The wire is withdrawn and the needle securely screwed on to the barrel of the syringe, which is held needle end upward. The air is then expelled by pushing the piston upward until a drop of the solution appears at the point of the needle. Enclose the needle

end of the syringe within the sterile sponge and carry to bedside.

Preparation of the skin

Withdraw the syringe from the folds of the sponge and hold it horizontally between the first and second fingers without touching the needle or the piston. Holding the sponge in the other hand, rub briskly with it at the point of injection until the skin is red, which aids in absorption and lessens the sense of pain; then stretch the skin and grasp a fold of the muscle.

Insertion of the needle

Hold the needle at an angle of 45° to the skin at the site of injection and direct the needle point upwards

INSERTION OF THE NEEDLE

into the subcutaneous tissues or muscle. Quickly puncture the skin in the area chosen and direct the needle to the desired location with one smooth movement. Inject the contents of the syringe into the subcutaneous

tissues or muscle by slow and steady pressure on the piston, with the tip of the index finger or thumb. Pause a few seconds, to await absorption, and then withdraw the needle quickly with one movement of the hand, keeping firm pressure the while with the sponge over the point of insertion. This prevents the leakage of any of the injected material. Gentle massage for a few seconds with the sponge immediately after withdrawal of the needle aids in more rapid absorption of the drug.

Record the drug, dose and time, in writing, in the proper place, as directed.

After care of syringe

Remove the needle from the syringe and fill the barrel with 95% alcohol from the container. Replace needle and force out alcohol. Repeat this operation at least twice. To prevent rusting, detach needle, insert wire, place in spoon and dry over alcohol flame, or draw wire in and out several times, wiping it each time. If the needle is not in frequent use, run wire through boric ointment before inserting. Dry piston and barrel and replace in alcohol. When sterilizing a syringe, remove the piston from the barrel, wrap both in gauze, and tie with a bandage, allowing the end to hang over the edge of the sterilizer for easy removal.

Precautions to observe

A deep-seated abscess may be the result from such conditions as: (1) an unsterile needle, (2) unclean skin at point of insertion of needle, (3) unclean hands, (4) de-

composed solution of a drug, (5) tablets not thoroughly dissolved, (6) an unabsorbed drug in conditions of weakened circulation, (7) or an irritating drug.

Do not wiggle or move needle around after piercing skin. Most needles break at the shank, because of lateral or bending pressure, and should be tested before injection, by light pressure upon the sterile gauze.

Needles are apt to break if blunt or corroded; if directed into the tough, loose skin of an elderly or emaciated person; if a bone or tendon is struck; if attempts are made to introduce the needle unawares; if an injection is given to a struggling patient, without help. If a needle should break under the skin, surround the spot of entrance at once with pencil or iodine. Save the remainder of the needle. Do not alarm the patient. Do not rub the spot. Report.

A large blood vessel or nerve may be punctured if the needle is directed towards the inner surfaces of the arms or legs.

Unnecessary pain is caused if a blunt, coarse, or rusty needle is used; if introduction is too slow; if syringe is handled unsteadily after the needle has punctured the skin; if the angle of the needle is too slanting; if the quantity of the solution is too large; if drug is injected too quickly; if given too superficially, when an irritating drug is used.

Method of filling the syringe with different preparations of drugs and sera

Solutions for subcutaneous injections are sterile preparations of distilled water and a drug of a certain

strength to a given proportion of water. In filling the syringe, the sterile needle is thrust directly into the solution, avoiding the mouth and bottom of the bottle. The required amount is drawn into the syringe, plus one minim, to allow for loss when expelling the air. The bottle is immediately covered after withdrawing the needle.

Sera or vaccines and insulin come prepared in small glass vials or bulbs. The mouth is covered with a rubber diaphragm, which is a form of stopper, and is disinfected before using by dipping in a bowl of 70% alcohol or tincture of iodine. The content is removed by thrusting the sterile needle of the syringe through the rubber, and with the vial inverted, the content is drawn into the syringe.

When filling a syringe from an ampule, the ampule is dipped in 70% alcohol or iodine, and enclosed within the folds of a sterile gauze sponge or towel wrung out in the alcohol. The tip of the ampule is carefully broken off. The sterile needle is thrust within the opening, and with the ampule on its side or inverted over the needle, its content is drawn into the syringe.

Glass syringe

A glass syringe is made up of a barrel, piston and needle. On the side of the barrel is a scale indicating its capacity in the metric and apothecaries' systems. Syringes used for ordinary subcutaneous medication register 2 c.c. or 30 minims. The glass piston is detachable. The needle fits over the projecting tip of the barrel. About its mouthpiece is a small metal collar

and chain which keep the piston in place and steady the syringe while in use. The glass syringe is preferable to a metal one because of its simple construction, its greater capacity and ease of sterilization, as in the use of novocaine in operations when strict asepsis must be observed. Because of their fragility, however, glass syringes are not used commonly in some hospitals, but are reserved for the administration of special preparations of drugs containing mercury or iron, such as Hayden's solution or citrate of iron, because of the effect of the drug upon the metal syringe.

The method of using a glass syringe is the same as that of the metal syringe, except that the tablet of a drug may be dissolved directly in the barrel of the glass syringe, into which has been previously drawn or poured a small amount of sterile distilled water.

Method of sterilizing glass syringes

The glass piston and barrel of the syringe are enveloped separately in gauze and placed in the sterilizer in tepid water. They are removed five minutes after the boiling point has been reached. Following the use of the syringe in a case of an infectious disease or spore producing micro-organisms, it should be boiled fully twenty minutes or be autoclaved.

Fractional doses

Method of working out problems for subcutaneous medication

Drugs used for subcutaneous medication are prepared in tablet form or the drug may be in solution.

Problem 1. To prepare a dose of a drug from a tablet when the required dose differs from the strength on hand:

Example: Give atropine sulphate grains $\frac{1}{150}$ from tablets grain $\frac{1}{100}$.

Rule: (1) Make a common fraction of the two strengths, having the strength on hand as the numerator, and the required dose as the denominator.

(2) Reduce this fraction to lowest terms.

Example: Strength on hand = grain $\frac{1}{100}$.
Strength required = grain $\frac{1}{150}$.
Fraction = $\frac{100}{150}$ and
Reduced = $\frac{2}{3}$, which is the part of the whole tablet necessary to give the required dose.

(3) In order to get this fraction of a tablet accurately, it is necessary to dissolve the stock tablet in water. To do this, choose any number of minims which the syringe will hold, that can be divided evenly by the denominator of the above reduced fraction. A number whose fractional part does not give more than 15 or less than 10 minims for an answer is desirable, as this is the best amount of liquid to give subcutaneously, as it is better absorbed on account of the sugar of milk which the tablet contains.

(4) Example: Number chosen = 15 minims.
Dissolve the stock tablet in this amount.

(5) Dose required, according to above fraction = $\frac{2}{3}$ of stock tablet.

(6) Therefore, dissolve 1 tablet grain $\frac{1}{100}$ in 15 minims of water and take $\frac{2}{3}$ of 15, which equals 10 minims. This is done by expelling 5 minims from the syringe and the remaining 10 minims is the amount to give for the required dose.

Problem 2. To prepare a dose when more than 1 tablet is needed for the required amount:

Give atropine sulphate grain $\frac{1}{120}$ from tablets grain $\frac{1}{200}$.

According to rule: the fraction is $\frac{200}{120}$.

Reduced $= \frac{5}{3} = 1\frac{2}{3}$, which means that one whole tablet and $\frac{2}{3}$ of another have to be used in order to give the required dose.

Always prepare fraction of 1 tablet first, which in this case is $\frac{2}{3}$, by dissolving one stock tablet in 30 minims of water. Then $\frac{2}{3}$ of 30 = 20 minims. To this 20 minims add one whole tablet, as problem indicates, which gives the required dose.

Problem 3. To prepare a fractional dose when the drug is in solution: In this type of problem the label always tells the amount of drug that has been dissolved in a certain number of minims.

Example: The label on a bottle reads

MXII = grain $\frac{1}{30}$. How many minims would be necessary to give grain $\frac{1}{120}$?

Working out problem as for fractional doses from tablets,

Fraction $= \frac{30}{120}$ or $\frac{1}{4}$.

Then $\frac{1}{4}$ of 12 minims (because this is the amount of solution which represents grain $\frac{1}{30}$) = 3 minims or the required dose.

Problem 4. Method of preparing two different drugs to be given subcutaneously at the same time when both the strengths ordered differ from those on hand:

Example: The dose ordered is morphine sulphate grain $\frac{1}{12}$, and atropine sulphate grain $\frac{1}{150}$, to be given in 15 minims of water.

On hand are tablets of morphine sulphate grain $\frac{1}{4}$, and atropine sulphate grain $\frac{1}{100}$.

Rule: Follow that given under fractional doses to determine first the part of the stock tablet to use of each drug.

Example: $\frac{4}{12} = \frac{1}{3}$ of stock tablet of morphine necessary and

$\frac{100}{150} = \frac{2}{3}$ of stock tablet of atropine necessary.

Procedure

Boil water and needle in the usual way.

Measure 15 minims of sterile water from the spoon into a graduate and place to one side.

Fill the syringe again with 15 minims of water, from the spoon.

Empty the spoon and dry, if necessary, with a sterile sponge.

Drop the $\frac{1}{4}$ morphine tablet into the spoon and dissolve it with the 15 minims of water in the syringe.

Carefully draw up 5 minims of this solution, which gives the $\frac{1}{3}$ tablet, as required, and now equals $\frac{1}{12}$ of a grain.

Empty the spoon again and dry.

Drop the $\frac{1}{100}$ atropine tablet on hand into the spoon, and dissolve with the 15 minims of sterile water re-

served in the graduate. According to the problem, $\frac{2}{3}$ of this solution or 10 minims is necessary for required dose.

Then with the syringe, which now contains grain $\frac{1}{12}$ of morphine in 5 minims of solution, carefully draw up 10 minims of the atropine solution, which equals grains $\frac{1}{150}$, making a total of 15 minims. This is then given in the usual manner.

LIII

INTRAVENOUS OPERATIONS

Veins are opened for the removal of blood for various purposes and for the injection of a fluid directly into a vein for medication or infusion to increase the volume of the blood.

MEDICATION

The intravenous route is used in certain instances when it is desirable to obtain immediate results and full action of a drug. Drugs acting on the circulatory system are occasionally given this way. In certain cases of septicemia, following transfusion mercurochrome is injected as a 1 per cent solution in distilled water; it is also given in gonorrheal infection. Certain drugs, as arsphenamine (606) and its allied preparations, that are too irritating to be given subcutaneously and are not absorbed if given by mouth, are, as a rule, administered intravenously.

As an example of intravenous medication, the administration of arsphenamine and neo-arsphenamine is here described, when used for anti-syphilitic treatment.

Severe reactions occasionally follow the intravenous administration of anti-syphilitic remedies, so that only a doctor or a specially trained technician or nurse should carry out this procedure. In the great majority of cases no ill effects are obtained.

Gown and rubber gloves are worn by the doctor and his assistant.

Preparation of arsphenamine

Equipment

flask of freshly distilled sterile water
empty sterile flask
sterile filter paper
sterile funnel
pink litmus paper
sealed ampule in bowl of corrosive alcohol
small sterile steel file
small bottle of sodium hydroxide (15%)
bowl of soapy solution
bowl of corrosive alcohol

Concentration

The solution is made up in a concentration of 0.1 gram arsphenamine to 20 c.c. of freshly distilled water. The ampule is removed from the alcohol and held within the folds of a sterile sponge. A nick is made in the neck of the ampule with the sterile file and the top of the ampule knocked or broken off, and the contents, a yellow powder, is emptied into the flask containing the distilled water by tapping on the ampule with the file.

The flask is now gently rotated to dissolve the arsphenamine, but never shaken, for fear of gelatinizing the solution.

When the powder is completely dissolved, 3 drops of sodium hydroxide (15%) are added for each 0.1 gram of arsphenamine dissolved. The addition of the sodium hydroxide is for the purpose of neutralizing the arsphenamine.

The solution will at first be cloudy, then it becomes a transparent amber. The solution is tested with the pink litmus paper, and if alkaline in reaction, is then filtered through sterile filter paper and sterile funnel, when it is ready for administration.

Preparation of neo-arsphenamine

Neo-arsphenamine (the Greek prefix signifying "new") is a compound prepared from arsphenamine and, like arsphenamine, used chiefly for the treatment of syphilis. This drug is a yellow powder, which dissolves readily in distilled water and has a neutral reaction. Like arsphenamine, it is put up in sealed ampules.

Concentration

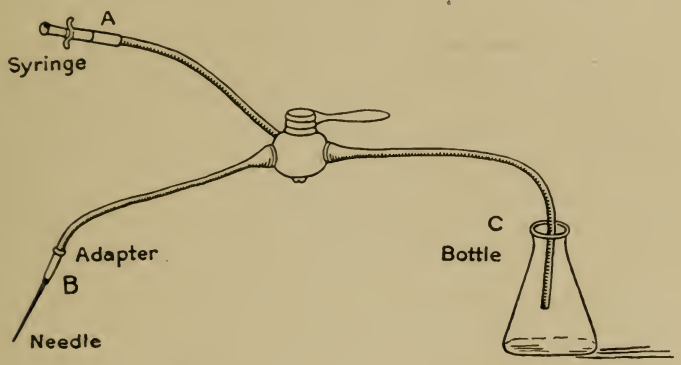
0.45 gram is generally dissolved in a sterile, wide-mouthed, 4-ounce bottle containing 20 c.c. of sterile distilled water. The bottle is agitated gently until the solution is clear. Sodium hydroxide is not required. It is not necessary to filter it, and if the solution is not clear or crystals remain undissolved, it is safer to discard this solution and make up another one. Sterile precautions are used as in the preparation of arsphenamine.

Administration of arsphenamine and neo-arsphenamine

On a table covered with a cotton and a rubber sheet is a pillow for the patient to recline on. The table should be of convenient height for the operator. The following equipment is placed upon an instrument table covered with a sterile half-sheet:

Equipment

A three-way stopcock with 3 small rubber tubes about 40–50 cm. long. On the end of one tube (*a*) is a 30 c.c. glass syringe; on another tube (*b*) an adapter, a small device of metal for connecting the intravenous needle to the tube; the end of the third tube (*c*) is placed in a small flask of sterile normal salt solution.



sterile sponges

light-weight rubber tourniquet, and a hemostat to hold it

250 c.c. sterile glass cylinder for the arsphenamine solution

Sharp intravenous needles are kept in 70% alcohol at one side.

If neo-arsphenamine is being used, it is withdrawn directly from the 4-ounce bottle in which it has been freshly prepared.

The entire apparatus used in the injection should be sterile.

Procedure

With the end of tube (*c*) in the flask of normal saline, the system of tubes is filled by manipulation of the syringe on tube (*a*) by adjusting the stopcock properly. The sterile needle is fitted to the adapter and a little salt solution washed through, about 5 c.c. being left in the syringe. The patient's arm at the bend of the elbow is cleansed with soapy solution and corrosive alcohol. The rubber tourniquet is applied above the patient's elbow and held with snug pressure by the hemostat. Avoid completely shutting off the pulse, as that would interfere with the operation of getting blood. The patient is instructed to close the fist, and if the vein is not in plain view, the operator slaps the area over the bend of the elbow two or three times smartly, when the vein will become prominent and venipuncture is more easily done. The operator holds the forearm with his left hand, drawing the skin down with his thumb, the needle is inserted, lifting the skin as it is punctured, and is directed into the vein slowly, to prevent going through the opposite side of the vein. After the needle is inserted well into the vein, the tourniquet is released and the patient relaxes his hand. 5 c.c. of the salt solution is first injected, to make sure that the needle is in the vein. Arsphenamine or neo-arsphenamine is very irritating to the tissues and causes pain and sloughing if given under the skin outside the vein.

Now tube (*c*) is transferred from the normal salt solution to the solution to be injected, and by the manipulation of the stopcock the arsphenamine solution is drawn into the syringe and then slowly injected into

the vein. All of the arsphenamine may not be given in one syringeful, but the amount can best be measured by reading the level of the solution on the scale of the cylinder. For example, to give 0.3 gram of arsphenamine, pump the solution from the arsphenamine cylinder into the vein until the level in the cylinder is reduced from 250 c.c. to 190 c.c., or until 60 c.c. have been given.

Tube (*c*) is returned to the normal salt solution and a little salt solution is injected into the vein in order to wash out any remaining arsphenamine solution into the vein.

The needle is quickly withdrawn and pressure made over the needle puncture with a sponge, and the patient is instructed to flex his arm for a moment. If bleeding has stopped, the sponge is removed and the puncture covered with collodion.

Patients who are undergoing routine anti-syphilitic treatment are questioned by the doctor as to their condition since the last treatment, for the occurrence of chills, and the skin is examined for a toxic rash before giving the next treatment. The patient's condition thus serves as an index for each treatment. Patients showing a reaction may be kept under observation in a hospital for a few days, if the reaction is a severe one. Adrenalin and sodium bicarbonate and sedatives are kept on hand where arsphenamine is administered for use in emergencies following medication. The reaction may occur as an immediate flushing of the face, dizziness, severe headache, a sense of tightness about the chest, nausea, vomiting, fever or collapse. Occasionally the

reaction is delayed for fifteen minutes to one-half hour. Weeks later more severe but rare symptoms, such as desquamation of the skin or jaundice, may develop after four or five doses of arsphenamine have been given to susceptible individuals.

Instruction to the patient

In order to help avoid a gastric reaction of nausea and vomiting following arsphenamine medication, the patient is instructed to eat a light breakfast, composed of a cup of black coffee and one or two slices of dry toast. No milk or eggs should be taken, as they are especially liable to cause nausea and vomiting after arsphenamine.

Food should not be taken for four hours following the treatment; rest and quiet also are important.

On the morning following the treatment a saline laxative should be taken.

VENIPUNCTURE AND VENESECTION

As an example of venipuncture for the withdrawal of small amounts of blood, the Wassermann test is described.

The Wassermann test

To secure blood for this test when syphilis is suspected and also as a guide in its treatment, venipuncture is frequently done by the nurse at the request of the doctor, if she has had previous experience.

Equipment

A small tray is set up with
- package of sterile sponges
- antiseptic alcohol, 70%
- flexible collodion and applicator
- half-inch rubber tubing tourniquet and hemostat
- 20 c.c. syringe
- needle, selected according to size of vein, attached to syringe
- sterile test tube or glass container labeled with the patient's name, date, ward, service and purpose of test

Avoid sterilizing needle and syringe in medicated alcohol, the ingredients of which cause hemolysis. If this method must be employed, the needle and syringe should be rinsed in sterile salt solution before withdrawing the blood.

Procedure

The site of puncture at the bend of the elbow is thoroughly cleansed with the 70% alcohol, and the tourniquet is applied to the arm above the elbow (see illustration, page 133), and either is tied with slight pressure or held in place with a hemostat.

After the tourniquet is on, if the veins are not prominent, the patient is directed to open and close his hand slowly and firmly. If that fails, the area may be slapped sharply, and often the veins will dilate enough to be visible. The operator holds the forearm with his left hand, drawing the skin down with his thumb, and inserts the needle slowly, lifting the skin, as before described.

As soon as the blood flows the tourniquet is loosened, and the necessary amount of blood taken. Before the needle is withdrawn a sterile sponge is held lightly over the needle, and is immediately pressed hard upon the site of the puncture on withdrawal of the needle. The patient is directed to flex his arm, thus making pressure. This prevents external bleeding and extravasation of blood into the tissues. When the bleeding stops, the puncture is covered with flexible collodion. The blood withdrawn is syringed out into the labeled container immediately, before coagulation takes place, and is sent to the laboratory for study.

When giving children the test, the blood may be removed from the jugular vein.

Venesection

The opening of a vein by incision for blood letting is known as venesection or phlebotomy. Venesection is resorted to when the vein is too small for a needle and when large amounts of blood are to be removed.

The operation is a delicate one and consists of dissecting the vein free and making a slight incision. The vein commonly selected is the median cephalic, or the median basilic, slightly below the elbow. A ligature is placed above and below the vein but not tied until the blood letting is completed.

Purpose

Venesection is sometimes done in conditions of uremia, in toxemia of pregnancy, and in high blood pressure, when as much blood as the patient can stand is with-

drawn. This is determined by blood pressure reading on the sphygmomanometer, and signs of collapse.

For relief in acute dilatation of the heart when there is unrelieved congestion and hypertension with pulmonary edema and dyspnœa.

In polycythemia, a condition when the red blood corpuscles are in excess of normal.

Equipment

A tray with

3 packages sterile sponges
3 sterile towels
half sheet and rubber
round enameled basin
small bowl of alcohol, 70%
novocaine, 1%
iodine, 7%
sharp scalpel
surgical scissors
forceps
2 Elsberg hooks to keep walls of veins apart
2 hemostats
sterile syringes, 2 c.c., with needle for novocaine
syringes, 30 c.c., for suction
cannula with short length rubber tubing
sterile 500 c.c. flask for blood
light-weight, half-inch rubber tourniquet
catgut ligatures
horsehair suture and needles
adhesive tape
2-inch roll cotton bandage
sphygmomanometer

Duties of the nurse

Besides setting the tray, the nurse arranges the materials at the bedside, prepares the area at the bend of the elbow as outlined by the doctor, drapes the arm with a sterile towel above and below the point of operation. Especial care should be taken in preparing the skin, because of the nature of the operation.

Following the preparation of the skin, the novocaine is injected intradermally by the doctor.

The nurse may be asked to apply the tourniquet for engorgement of the vein, and to steady the patient's arm, which she does under the folds of the sterile towel, so that her hand may be out of the field of operation.

If the sphygmomanometer is used, she may have to observe the blood pressure readings.

If a large bleeding and the patient is apprehensive, he should be reassured, made comfortable and kept quiet. The patient's condition should be watched throughout the operation. When it is finished, the wound is closed with a continuous suture and a sterile dressing applied of gauze sponge and bandage.

The patient's general condition and pulse should be closely observed by the nurse following this operation.

LIV

PREPARATION OF PATIENT FOR X-RAY EXAMINATION

The diagnostic value of a roentgen examination depends in no small part upon the careful preparation of the patient, the removal of all clothing and dressings, in order to eliminate as much as possible any external obstacle to an accurate interpretation of the roentgenogram.

The nature and extent of the preparation of the patient depend on the part of the body to be observed.

One must bear in mind that all metals and metal-containing substances resist penetration by X-ray, consequently confuse or obscure the field under observation, frequently necessitating a repetition of the whole examination.

On the other hand, in an X-ray study of the hollow organs of the body, such as the gastrointestinal or urinary tract, certain metallic salts in solution are used in the examination to coat the walls of these organs and fix their outlines for identification. The substance used and method of administration depend upon the regions to be examined.

For study of the œsophagus and gastrointestinal tract, barium sulphate is more commonly used, given to the patient by mouth, a barium meal for examination of stomach and duodenum; or by rectum, a barium enema for examination of colon.

In the study of the urinary tract, cystoscopy is frequently followed by a pyelogram or radiographic picture. With the radiographic catheters in place, a solution of sodium iodide (12%) is injected, thus outlining the kidney, pelvis and ureter, and the pyelogram made before the opaque material flows out.

Procedures in various X-ray examinations

The following rules for the removal of apparel and other articles will serve for both outpatients and hospital patients incident to X-ray examination.

Head

Remove artificial teeth on plates, glass eyes; and with women patients, hairpins, combs, barrettes, earrings, necklaces, or beads.

Upper extremities

Bracelets and sometimes rings are taken off.

Chest

All patients having chest or gastrointestinal examinations should wear hospital clothing, including slippers, as it is necessary for the patient to stand for fluoroscopy.

Gall bladder, kidney, pelvis

Under ordinary conditions, there is no special preparation unless ordered by the doctor. The meal nearest the time of X-ray examination is omitted. At the time of coming for examination, the removal of corsets, waists, abdominal supports, or any article which may have metal parts, is required. If a binder is worn, it should be temporarily removed, when possible. Adhe-

sive plaster should be removed in so far as it is consistent with safety and the purpose which it serves. In this case, the roentgenologist or doctor would probably assume this responsibility, together with that of removing plaster of Paris casts or splints.

Gastrointestinal

No catharsis, enema, opiates, or atropine should be administered the day before examination. On the morning of the examination a drink of barium sulphate is given, usually at 8 o'clock, followed by a light breakfast (no meat or eggs). The patient is advised not to eat or drink again, except water, and then as little as possible, until after the first observation, which is usually 5 or 6 hours later. In the interval between the 6-hour and 24-hour observations, the patient may resume regular diet, but cathartics and other medication which might affect the intestinal motility should be withheld.

For an adult 4 ounces of barium should be mixed slowly with 8 ounces of potato flour gruel, or starch, until the consistency of thin cream, the gruel or starch acting as a vehicle for the barium powder, which is heavy and tends to settle in the drinking glass. Sometimes a tablespoonful of malted milk is added to give the mixture a palatable flavor. It is much easier to drink if taken through a glass drinking tube. In some clinics buttermilk or condensed milk is used instead of the potato flour gruel.

It is essential that sufficient barium mixture be given to fill out the stomach and duodenum. This mixture

is then carried along the intestinal canal by peristalsis, unless obstructed by disease.

If the first barium drink is not retained, this should be noted, and an attempt be made to repeat it, as the observation of the tract depends on the ingestion of the opaque meal for its visibility.

In certain instances of disease of the œsophagus or of lesions of the stomach with known obstruction, the barium drink is withheld at the discretion of the roentgenologist until the time of the fluoroscopic observation.

For study of the colon, there should be thorough evacuation of the colon by catharsis, preferably castor oil, the day before X-ray examination and a cleansing enema the morning of the examination, to eliminate as far as possible the presence of gas and intestinal contents. For Barium Enema, see Chapter XXV, page 158.

LV

SURGICAL NURSING

ADMISSION OF A SURGICAL PATIENT

See Part I, Chapter XXXV, page 232.

It should be remembered by the nurse that a patient who enters a hospital for a surgical operation arrives in the hospital ward in a more disquieted and apprehensive state of mind than the sick patient who enters a medical ward. The fact of an operation, no matter how simple it may seem to the nurse, stands between his possible return to his home and friends. The very atmosphere of a surgical ward may be suggestive. It is noticeable in many cases that the patient dreads the anesthetic more than the operation. The fear of not regaining consciousness seems to be predominant. In these experiences with the patients it is of great importance that the nurse should cultivate mental resources, a hopeful, comforting, reassuring attitude, with a sympathetic touch where depression of spirits and fear exist. A pessimistic state of mind on the part of the patient may counteract the otherwise successful outcome of an operation. A surgeon has been known to hesitate to operate on such a patient because of the possible serious results.

The temperature, pulse, and respiration are recorded and reported to the doctor, also the patient's general condition. With some exceptions a tub bath is made ready for all surgical patients who walk in. A bed bath

is given to a patient who walks in with a temperature over 99° or a pulse over 100, to a patient with a discharging wound, hyperthyroidism, or any other condition in which there is the slightest doubt in the mind of the nurse in charge as to the advisability of a tub bath.

A specimen of urine is sent to the laboratory on admission of the patient. No catharsis is given unless prescribed. To get accustomed to the use of the urinal before operation, male patients are required to use it while lying in bed. The same rule holds in the use of the bedpan in all surgical cases.

Physical examination and routine examination of the blood are made by the doctor.

All surgical patients go to bed and remain there until the doctor allows them to get up.

PRE-OPERATIVE DIET

With a view to minimizing the pains and discomfort following operation, the patients, before operation, are placed on a diet known as "pre-operative," which will be quickly absorbed and will leave very little residue in the intestinal tract.

This diet is given to all admissions to the surgical wards unless other special diet has been ordered. Pre-operative diet is much like the soft-solid diet, with certain omissions and additions which should be carefully noted. It is important that the patient should have no milk. Patients should be encouraged to drink water freely between meals. Patients with abdominal pain *have nothing* by mouth until seen by the doctor.

Breakfast

orange juice
soft cooked egg
toast with butter
tea or coffee, without milk

This is the same as the "soft-solid" diet sent from main kitchen, omitting milk and cereal; orange juice added.

Dinner

broth, without milk
chicken
toast and butter
mashed, steamed, or baked potato
tea, without milk
dessert, plain jelly

A small portion of each article should be served and only one helping given.

This is the same as the "soft-solid" dinner, substituting plain jelly as dessert, and omitting milk.

Supper

beef broth
soft cooked egg
toast with butter, and honey if desired, or orange juice
tea, without milk

It is not desired to keep the patient on this diet for more than two days. If the patient is brought into the hospital for observation and study over a longer period, the doctor is consulted as to suitable diet.

Pre-operative diet does not take precedence over any special diet ordered by the visiting surgeon or house-officer.

LOCAL PREPARATION

Supplemental to Part I, Chapter XXXVII, page 244.

Areas for shaving

Face

A woman patient does not have her face shaved, except when required about the margin of the hair.

The barber or orderly shaves the men.

Chest

The same treatment is required as in the preparation for breast operation, with the exception of shaving the arm.

Abdominal region. This includes gastric operations.

Prepare from the level, below the breasts, to, and including pubes, and to midaxillary line.

Inguinal region. Usually for inguinal hernia.

Prepare pubes on both sides from level of umbilicus to upper third of thigh. Omit alcohol on labia and scrotum.

Vaginal and perineal region

Shave pubes both sides, vulva, perineum and about 2 inches above the anus in the region of the coccyx.

Rectal region

Shave area 4 inches in diameter about anus. Do not shave pubes or vulva.

Extremities

Shave to level indicated by the doctor. See Varicose Veins, Part I, Chapter XXXVII, page 247.

Except when a dry shave is requested, the following method of preparing the patient serves in all ordinary cases. The field of operation is cleansed from extraneous

material from the sweat and sebaceous glands and dead skin cells, and thereby the danger of infection is lessened.

Equipment

small blanket
small tray
2 small bowls
warm soap solution
borated alcohol, 70%
kidney basin with toilet paper
razor box containing:
  safety razor and blades
3 packages sterile sponges
2 sterile towels
straight binder
2 perineal straps
8 large safety pins

An abdominal operation has been chosen as an example for procedure.

Procedure

In carrying on this procedure the nurse's sleeves should be rolled up above the elbows.

Open the packages of sponges and turn one into bowl of soap solution, the second into bowl of alcohol; the third package is opened, but sponges are left in their cover.

Shaving the patient

Fold back the bedclothing on level with pubes. Tuck a dressing towel over the edge of the bedclothing. Lather

the skin in the area of operation with warm soap solution, using a sterile gauze sponge. Shave, wiping the razor at intervals with toilet paper, which is deposited in kidney basin. Care must be exercised to avoid cutting or scratching the skin with the razor, as it leaves a sensitive surface for the remainder of the preparation, to the discomfort of the patient, and opens an avenue for infection of the surgical wound later. When the shaving is completed, the skin should be dried with a sterile sponge and inspected by the nurse for areas which may have been overlooked. Leave a soapy sponge over the umbilicus. The towel which protects the edge of the bedclothing is turned over the patient's abdomen for protection until ready for cleansing the skin.

Nurse's preparation

Lather and scrub arms, hands, and finger nails under hot running water, cleanse the finger nails with orange stick, and scrub again for two minutes. Then rinse under running water.

Preparation of patient

Complete cleansing the umbilicus with absorbent cotton swabs and soap solution. Scrub the shaven surface of the skin for five minutes with soap solution and sterile sponges from the umbilicus out in circles. Wipe off soap with dry sterile sponges. Scrub again for two minutes with 70% borated alcohol. Cover area with dry, sterile towel held in place with a straight binder and perineal straps. Clear up equipment.

Morning of operation

The patient remains in bed. The second, or preoperative specimen of urine is sent to the laboratory.

A suds enema is given in the morning as directed. Report if the result has not been satisfactory.

Liquids without milk are given until within three hours of operation.

Have a dose of morphine and atropine sulphate in the hypodermic syringe ready for administration when the call comes from the operating room.

Final steps

See Part I, Chapter XXXVII, page 245, on details of preparation.

To avoid unnecessary haste or excitement attending the transfer of the patient to the operating room, the clothing needed for dressing the patient should be ready at the bedside. The final duties in connection with the patient should be carried out by the nurse in a quiet and orderly manner, and the patient should never be hurried. To aid in getting the coöperation of the patient sometimes a few words in explanation for the reason of certain steps may not be out of place, so long as details of the actual operation are not discussed. The patient should be comfortably dressed and protected against unnecessary exposure.

A nurse always accompanies the patient to the operating room, preferably the patient's nurse. The majority of patients go to the operating room on a stretcher. The patient is enveloped in a sheet and blanket, and carefully lifted by the orderly from the bed to the stretcher. In other cases, for various reasons, it is well to transfer the patient in a wheel chair. No patient should be allowed to walk to the operating room after receiving a hypodermic injection.

LVI

SURGICAL NURSING, *continued*

For making of an Ether Bed, see Part I, page 50.

Return from operating room

The nurse precedes the stretcher with the patient and quickly turns the upper bedclothing, then the gray blanket, to the extreme foot of the bed. Every hot water bag is removed, and none replaced without an order. The stretcher is wheeled to the foot of the bed. The upper blanket is removed, the enveloping blanket is left on the patient. The nurse and orderly, one on each side of the bed, lift the patient carefully and evenly into bed by means of the folded blanket on which he has been lying while on the operating table and which serves as a stretcher throughout. The second nurse, who is detailed to special the patient, lends her assistance as needed. The blanket is slipped out and the patient placed on his side, unless the nature of the operation or injury prevents. The patient is at once covered with the blanket and the enveloping sheet is removed, when the upper bedclothing is drawn up so that he is well covered. The second pillow is tucked snugly against the shoulders and back. The upper knee should be slightly flexed to maintain a semilateral position. The dressing towel is tucked cornerwise under the patient's chin. If on an open ward the bed is screened, and a nurse detailed in all cases to care for the patient until his return to consciousness.

If vomiting on arrival, keep the patient's head turned

to one side and wipe out the mouth. Wet clothing should be removed at once and be replaced with a warm blanket without unnecessary exposure.

Immediate observations are made by the nurse on the arrival of the patient, *i.e.,* the color of the face, the respiration, quality of the pulse, temperature of the body and condition of the skin to the sense of touch, regional inspection of the binder or bandage for blood stains.

Special observations and care

Color of the face

In the early stages of recovery from ether, the patient's face is usually flushed or slightly dusky. Any change of color should be noted. Sudden blueness (cyanosis) may denote cardiac failure or lack of oxygen due to obstruction of respiratory passages. If this condition prevails, investigate at once for retained mucus or vomitus. Use the tongue forceps or wrap the wooden gag or fingers with a few layers of moistened gauze and quickly sweep out the back of the mouth, at the same time keeping the patient's face well turned to one side and the tongue pulled forward by grasping with a gauze sponge. In some cases one may hook the inside of the cheek with a finger and draw it away from the teeth, which will permit some entrance of air, especially if there should be a space left by a missing tooth.

If the teeth should become clenched, push or draw the jaw forward and downward, and introduce the mouth gag carefully to prevent injury to teeth, unless the occasion is one of emergency, then no time is to be lost. If the fingers are used to handle the gauze in wiping

the back of the mouth, they should be well protected in case the patient may unconsciously shut down his teeth upon them.

Pallor, with a pinched expression, a slowly rising pulse of feeble quality and increasing restlessness, point towards hemorrhage. Look for staining and report condition. If the pallor is from shock, the alertness and restlessness are less marked.

(For nursing care of shock and hemorrhage, see page 422.)

Respiration

The respiration is usually stertorous, especially in a stout, short-necked patient. Changes in breathing should be closely observed.

The measures referred to above under cyanosis are employed in any interference with the respiration. If, with each expiration, a bubbling or rattling sound is heard, it indicates mucus in the region of the glottis, and the back of the mouth should be swabbed out to prevent inhalation of this material into the bronchi and to keep the air passage clear.

Special care should be taken with the emergency cases which enter the hospital for immediate operation without preparation for anesthesia, the danger being that of asphyxia from food inhalation.

Failure of respiration

Paralysis of respiratory centers due to over-etherization seldom happens as a post-operative emergency. If it should happen, most active first-aid measures are carried out. Artificial respiration may be done and oxygen

may be administered. The patient's head is turned on one side, and the tongue pulled forward, using a gauze sponge. Other methods may be used to start up the reflexes. These would not be in the province of the nurse unless she be an expert anæsthetizer.

Pulse

The quality of the pulse should be noted often and its rate recorded every ten minutes until the patient returns to consciousness. If the pulse should gradually gain in rate and lose in quality, it should be reported to the one in authority.

Temperature of body and condition of skin

The skin of an ether patient is usually warm and moist. If cold and moist under cover, measures should be taken at once to increase body heat without causing sweating. Dry the skin, wrap an additional warm blanket about the patient, and apply hot water bags at official temperature of 115° F. Hot water bags are not applied at a higher temperature without a written order by the doctor. Extreme care must be exercised to protect the patient from the bags, as such patients become burned very easily, owing to dulled sensation and poor circulation. Hot saline solution or shock enema may be ordered.

Care during the period of vomiting

Vomiting usually starts as soon as the effect of ether begins to wear off, and before the patient returns to consciousness. Retching is most apparent as the stomach becomes emptied of its contents, and the patient becomes conscious. The nurse should be ready to assist the patient

as soon as vomiting is anticipated; this is recognized by the action of the accessory muscles of the neck and a gulping, swallowing action which precedes vomiting. In assisting the patient as he lies in the lateral position facing the nurse, she reaches over and places her right elbow behind the uppermost shoulder and draws it slightly forward and with her extended forearm and hand behind the patient's head, directs it forward so that the patient's face is slightly prone and completely turned to one side to promote free drainage from the mouth. With the other hand the kidney basin is placed under the lower edge of the patient's mouth to receive the vomitus. When there is no further need for the kidney basin it is placed on the stand and the patient's mouth is wiped with gauze from the lower edge upward. The mouth is also wiped out inside for retained mucus.

In abdominal cases where there are retching and straining, the region of the wound should be supported by the pressure of the nurse's hands. At this time investigate the binder frequently in the region of the wound and beneath the patient for blood stains.

Position

As a rule the patient is kept on his side until he has quite recovered from the anæsthetic, when he may be turned on his back with knees flexed and supported by a rubber cased pillow.

Return to consciousness

As the patient returns to consciousness the sensations of pain and discomfort are acute. He may become rest-

less and nauseated, and retching may be more active. If unguarded there is danger of falling out of bed. As a rule patients who are given morphine and atropine subcutaneously before taking ether make a more uneventful recovery and usually sleep off the effect of the anæsthetic. A nurse's impatience with a slowly recovering ether patient should never be manifested by shaking or calling to the patient to respond to her questions. The fact that he can mechanically tell his name is no sign of complete consciousness.

The patient should be permitted to sleep off the ether, and not be unnecessarily disturbed. Conditions unfavorable to the patient should not be discussed at the bedside, even if he is apparently unconscious or asleep. Glaring lights should be shaded or the patient be screened. As to visitors, the fewer the better; none if possible for twenty-four hours after the operation, unless on the danger list. Quiet is of importance to the patient's welfare.

Bedtime care

If the operation has been performed early in the day and the patient's condition warrants it, the usual bedtime care may be carried out with as little disturbance as possible; at least the face and hands washed. If vomiting has ceased the mouth should be swabbed out. If the patient has fully recovered from the shock of the operation, remove leggings, or laparotomy stockings, top gray blanket, and hot water bags if any. The under blanket is usually left until the following morning, as well as the rubber pillowcases.

The exposed part of the back may be bathed from

either side, and a small pillow inserted for comfort. Turn and shake the pillows. If the patient has quite recovered from the shock, a second pillow may be added to the first, and one in a rubber case may be placed under the knees for support. An opportunity should be given the patient to empty bladder. If not successful, report; otherwise measure urine and save specimen.

If nausea and vomiting have ceased, the patient may be permitted by the doctor to have sips of hot water, or hot bicarbonate of soda water (¼ teaspoonful to a glass of water); this is more gratifying in the end than cracked ice, which does not alleviate the thirst, and is productive of a dry tongue, dulled sense of taste, and gastric discomfort.

Finally examine the binder and bandage over and under the patient to detect any staining. If an amputation of arm or leg, inspect under the stump. In such cases a rubber tourniquet should be within reach at the bedside.

Note the pulse and general condition of the patient before transferring your responsibility to another nurse.

Observations

Ether patients should be carefully protected against exposure to drafts or cold.

Fowler's frame should be used to hold the bed in the desired position instead of wooden blocks, as they are of insufficient height.

Rectal saline infusions are given every 3 or 4 hours, as directed, 6–8 ounces at a time, the first as soon as the patient reaches the ward.

Nothing is given by mouth, unless ordered by the

doctor, following gastric operations, intestinal suturing, and cases of peritonitis.

Record the amount of vomitus in cases of intestinal obstruction.

Post-operative specimens of urine are sent to the laboratory on the first day.

Urine chart is kept until proper functioning of the kidneys is assured.

Four-hourly chart is kept.

During the first 48 hours morphine sulphate, grain ⅛–¼ subcutaneous, is ordinarily given for restlessness and discomfort as well as for pain. Report to the doctor at once if the dose ordered has been insufficient.

The day following operation

If the patient has quite recovered from ether the rubber pillowcases will be no longer needed. The under blanket and half sheet and rubber protector are removed also, which leaves the patient lying on clean under bedding, and little more than tightening of the under bedclothing will be necessary.

For refreshment and in case of any odor of the anesthetic clinging to the upper sheet, it and the pillowcase next to the head should be changed, as well as the nightgown.

After an abdominal section the patient is disturbed as little as possible, except while using means to make him comfortable and giving the necessary treatments incident to his condition. In some instances a full bath may not be permitted for at least 24 hours, although other duties pertaining to the patient's comfort may be

carried out. A light toilet may be done, such as washing the face and hands and care of the mouth.

To relieve backache the back should be bathed and rubbed with an alcoholic solution every 2 or 3 hours. A small, firm pillow or rubber bag filled with cool or warm water, according to which may give greater comfort, may be placed in the hollow of the back. If permissible, a slight change may be made in the position by raising the shoulder and hip on one side with a long pillow. In many cases the patient is slightly elevated on a low headrest.

When nausea persists, a few drops of vinegar or aromatic spirits of ammonia sprinkled on a piece of clean gauze may be given the patient to inhale.

For headache, in place of an ice cap, ice cold compresses may be applied over forehead and eyes.

For the relief of gaseous distention, a small suds or M. G. and W. enema is usually ordered. Between times a rectal tube is sometimes inserted. In order to learn the results of this treatment the exposed end of the tube may be placed under water in a urinal. If the gas escapes bubbles will be formed. The success, or otherwise, of these efforts should then be recorded. Often a slight change in the patient's position in bed is said to prevent gaseous distention.

When a nurse has cared for several surgical patients who have had abdominal section performed, she should by observation have acquired a knowledge of the conditions that commonly follow, and be able to anticipate them, and apply such nursing procedures as she is permitted by the doctor as quickly as the signs of discomfort arise, before the patient makes demands. Discomfort is bound to be followed by restlessness.

LVII

SURGICAL NURSING IN SPECIAL CASES

THYROID CASES

General pre-operative care

All thyroid patients are weighed before they go to bed, and the weight recorded. Patients with hyperthyroidism must be in bed within fifteen minutes of their arrival on the ward, because of the distressing symptoms, which are aggravated by any unusual exertion or excitement, *i.e.*, nervousness, exhaustion, and rapid heart beat. Emotional strain may increase the post-operative toxic reaction, which is sometimes fatal. Every effort should be made to calm and reassure these patients, and to bring them to operations with as little disturbance as possible. To this end, it is better for them to be in a room by themselves for two or three days before operation. Moving them on the day before operation is avoided, as unusual conditions may mean a sleepless night. Non-toxic cases do not need these precautions.

Nothing suggestive of operation should be done the night before. The local preparation should be omitted. On account of increased metabolism such patients stand starvation badly. They should have their usual supper (no tea, coffee, or red meats), and in addition, a lunch of crackers and milk, or cereal, at eleven at night, if awake. A hypnotic is usually indicated. The patient is not to be disturbed in the morning. The routine of

bathing is omitted, and the room and surroundings kept quiet.

Post-operative care

Simple goitres or non-toxic cases carry only the risks of an extensive neck dissection. In hyperthyroidism the chief danger lies in the toxic reaction developing rapidly after operations, usually reaching a maximum within 36 or 48 hours. A reaction is likely to be far more marked after thyroidectomy than after ligation. It is characterized by an intensification of the symptoms of the disease, increased restlessness and nervousness, vomiting, rapid pulse, and rise in temperature. In the more severe cases the temperature reaches 104° or higher, the pulse to 160–180, or even over 200. The respirations are rapid and shallow. The restlessness may become delirium, ending in coma and death.

After care is directed towards keeping the patient comfortable and quiet, supplying plenty of fluid, and reducing temperature. Special nurses are desirable and are essential in severe cases. A 2-hour chart should be kept in toxic cases until the danger of reaction is over.

Special pre-operative orders

Simple goitres: colloid goitre, adenoma, cysts, carcinoma of the thyroid, etc.

No breakfast is given the first morning until after metabolism is done, when the patient is put on house diet. If his condition permits, he is allowed to be out of bed.

The nurse should see that male patients are shaved daily except on the day of operation. No other skin preparation is done before the patient leaves the ward.

Hyperthyroidism: exophthalmic goitre (Graves disease), toxic adenoma.

The patient remains in bed and is given a headrest, if desired, for comfort, and an ice bag is applied to the region of the heart. A 4-hour chart is kept.

The nurse takes and records daily blood pressure. If indicated, blood grouping is done.

The patient should drink at least 120 ounces, or approximately 16 glasses, of water in 24 hours.

The patient is placed on a house diet of high caloric value, with extra food between meals unless he is nauseated. No tea or coffee are allowed. Lunch of crackers and milk is given each night between 10 and 12 P.M. if he is awake.

Special attention should be paid by the nurse that the patient shall have rest and quiet on the morning of operation; no bath, no local preparation. If awake, he should drink at least two glasses of water between 6 and 7 A.M.

Pre-operative medication

Patients are digitalized before operation if this is indicated. In very toxic cases with cardiac involvement, digitalis, grains 1½, 4 times a day is given over a period of several days.

Lugol's solution, minims 5, given 3 times a day (only in cases of exophthalmic goitre), is a comparatively new development in the preparation of these

cases for operation, and as yet the rational of the procedure is not entirely understood. It causes a marked improvement in the patient's condition, as evidenced by reduction in the severity of subjective and objective symptoms, drop in pulse rate and basal metabolism. The operation is performed after the maximum improvement by Lugol's and rest is obtained.

The morning of operation, morphine, grain ¼, is administered 1½ hours before operation; and a second dose of morphine, either grain ⅙ or ⅛, with a dose of scopolamine, the dose depending on the size of the patient, or atropine, grain 1/120, when the patient is called to the operating room. The large amount of morphine administered is in preparation for the anesthesia, whether local or general.

Special post-operative orders

On return from operation the patient may be placed in any position desired for comfort unless otherwise ordered.

As a rule patients prefer a headrest, and at medium elevation. Water is urged as soon as possible without nauseating the patient, up to 120 ounces.

The urine is measured and recorded. The blood pressure is taken and recorded until the patient is able to be out of bed.

A 4-hour chart is kept until the patient is up. For soreness of the throat, hot medicated inhalations are used, and aspirin gargle is used also.

In the care of exophthalmic goitres, 6 ice bags are used and distributed thus:

2 applied to throat, one on each side
1 applied to each axilla
2 applied about the heart

Important post-operative complications

Hemorrhage. Watch for staining of dressing, steady increase in pulse rate, and a pulse of poor quality—shock.

Blood transfusions are done in severe cases of hemorrhage.

Tracheal obstruction (from edema of larynx or pressure by clots in the wound, and paralysis; recurrent laryngeal nerve). Watch for the slightest dyspnœa, cyanosis, or any embarrassment of respiration.

Tetany. Watch for numbness or stiffness of the extremities, contractures, convulsions. Tetany is due to low blood calcium. For tetany, calcium lactate, grains 15, is prescribed by mouth every 3 hours, or calcium chloride is given intravenously. In cases when the patient's hands are much contracted or a convulsion has taken place, a dose of magnesium sulphate, 25%, 10–20 c.c., is given intramuscularly by the doctor. This dose is repeated if the contracture of the hands or the convulsion recurs. The magnesium sulphate, a depressant, diminishes nerve activity and lowers intercranial pressure.

Rectal infusions are given in all cases to supply body fluids. Other medication may be ordered by the doctor when indicated. Mineral oil is given twice a day, if necessary, for the bowels.

The wound is dressed daily and the wick removed the first day. The skin clips which hold the edges of

the wound together are usually removed on the third day.

It is important that the patient should be given food as soon as possible. A diet of liquids and soft solids is given the first and second day; a high caloric diet is usually ordered. Carbohydrates are especially needed on account of greatly increased metabolism in this disease. The patient is put on a house diet without tea and coffee as soon as desired. Metabolism test and laryngoscopy for observation of the vocal cords are done before the patient is discharged.

GASTRIC CASES

Pre-operative routine

If not an emergency the patient is kept in bed to rest, and is usually observed and studied for several days before operation.

A 5-meal gastric diet is prescribed up to the night before operation. This diet is non-irritating and easily digested, consisting of liquids and soft solids, which may include the following:

gruels
malted milk
cereals
cream soups (not tomato)
unsweetened crackers
toast
rice
macaroni

No fruit drinks are allowed.

A specimen of urine and stool is sent to the laboratory for examination. Gastric cases which may indicate

ulcers, cancers, pylorospasm, etc., undergo special and careful study by the doctor.

Besides the ordinary tests examination of the blood is done, which includes:

the hemoglobin
red count
white count
blood smear, with analysis of unusual forms of cells, and differential count
Wassermann test

Blood grouping is usually done routinely in cases of bleeding ulcer or cancer. It is done also in any necessity that may arise in the course of the patient's stay in the hospital.

Pre-operative rectal infusions of normal saline solutions, or tap water, 250 c.c. (8 ounces), are given every 4 hours when fluids cannot be taken by mouth, or when not retained.

Pre-operative subcutaneous infusions of normal saline solution, or dextrose, 1000 c.c. (1 quart), are given usually twice a day in marked obstruction of the pyloric valve, when rectal infusions are not sufficient to supply the patient's fluid needs in 24 hours.

Gastric lavage may be done once or twice a day to rid the stomach of the large amount its walls secrete. It usually stops the vomiting and makes the patient more comfortable. Following the lavage, 15–20 grains of soda bicarbonate in solution may be left in the stomach.

Morphine sulphate, except in cases of bleeding, is rarely indicated pre-operatively, except in advanced cancer cases, for pain.

Atropine is prescribed sometimes to relax spasm of the pylorus, but is used chiefly in functional cases when the action of the organ is affected, and not its substance.

Post-operative care

The patient is kept flat in bed as a rule, except in some cases a low headrest is prescribed for comfort 24 hours after operation.

Morphine sulphate, grain $\frac{1}{6}$–$\frac{1}{4}$, may be ordered given every 2 hours as needed, for pain and discomfort. Tap water, 6–8 ounces, is given by rectum at 108° F. every 4–6 hours.

Subcutaneous infusions of saline solution, 500–1000 c.c. (16 ounces–32 ounces), are given on return from operating room.

Post-operative diet

Day of operation. Water, 1 ounce every hour, beginning 8 hours after operation, if the patient is not vomiting.

First day. Strained cereal gruel or malted milk, 2 ounces every 2 hours, alternating at hourly intervals with water, 2 ounces.

Second day. Cereal gruel or malted milk, 3 ounces every 2 hours, alternating with water, 3 ounces every 2 hours.

Third day. Cereal gruel, malted or boiled milk and water, half and half, 4 ounces every 2 hours, and water besides.

Fourth day. Cereal gruel, malted or boiled milk with

crackers or toast, 6 ounces every 3 hours, and 1 coddled egg in addition.

Fifth day. To previous day's diet add cream soups and soft cereals.

Sixth day. Add bread and butter and baked potato.

Seventh day. Same as sixth.

Eighth day. Five-meal gastric diet with care.

If the patient vomits, stop all food and give only sips of water, and start again on first day diet.

Discharge with 5-meal diet, as follows:

Three small meals of simple foods, not highly seasoned; no acids, no condiments, no fried food. Red meats are allowed once a day, chicken, fish, or eggs once a day in addition. Vegetables, only those that can be made into a purée. Between meals, *i.e.*, at 10 A.M. and 2 P.M., cereals, malted milk, milk with crackers or bread, egg-nog, making 5 meals in all.

INTESTINAL OBSTRUCTION, PARTIAL OR COMPLETE

Pre-operative treatment

Liquids without milk are given to the patient, if not vomiting. If enemata are ordered, note and record gas and fecal results. No catharsis unless prescribed. Rectal infusions of plain water are given as ordered, a pint at 108° F., unless too painful for the patient to bear; under such conditions the infusions should be given very slowly, to lessen liability to pain and for better retention.

Post-operative rules

No rectal infusions unless ordered. Such cases should never get rectal fluids.

ACUTE GENERAL PERITONITIS

Post-operative care

Fowler's position to be maintained. Sufficient morphine is prescribed to keep the patient comfortable. Nothing is given by mouth, but the patient's mouth may be swabbed for comfort every 2 or 3 hours, and cold cream applied to his lips.

Tap water or dextrose, 5% solution, is given by rectum.

If the patient is vomiting, saline solutions are given subpectorally as ordered.

If vomiting persists, lavage of the stomach is done.

No catharsis or enema is to be administered.

A rectal tube is used if necessary for relief of flatus, and the results are noted.

VAGINAL PREPARATION

The night before operation a gallon douche of corrosive sublimate, 1–8000, is given.

PERINEORRHAPHY OR SUTURATION OF THE PERINEUM

Post-operative routine

Patients should void or be catheterized 12 hours after operation.

Before resorting to the catheter all means should be used to encourage emptying the bladder, as already directed in Part I, page 178, urinary retention.

After urination or defecation the vulva is to be douched with warm 2% boric solution, and the stitches and parts sponged with dry sterile sponges. In douching, a glass or rubber urinary catheter should be used in place of the ordinary douche nozzle. Catharsis and suds enema are given the third day after operation.

The patient should be told not to strain, to avoid tearing the perineal sutures.

Sterile gauze and vulva pad, held in place with firm T-binder, should be worn constantly until the removal of the perineal stitches. Gauze packing in the vagina is to be removed in 24 hours, except when put in for drainage.

RECTAL AND COLON CASES

Including hemorrhoids, fissure and fistula of the anus, and polypus.

Pre-operative treatment

The day before operation castor oil, 1 ounce, or magnesium sulphate saturated solution, 1½ ounces, should be given if possible before 4 P.M. Suds enema is given the morning of operation.

Post-operative care

Sterile gauze and pad should be kept against the rectum, held in place with a T-binder. Liquids are given without milk for 4 days. Deodorized tincture of opium, minims 10, may be prescribed 3 times a day to arrest peristalsis and avoid bowel movements.

Fourth day. The patient is given a dropped egg on toast at 6.30 P.M. An oil enema, 6 ounces, is given at 8 o'clock, to be retained.

Fifth day. At 6 A.M., magnesium sulphate solution, 1½ ounces, is given; at 8 o'clock, a suds enema. Diet, soft solid.

Sixth day and subsequently. House diet is taken when the patient is ready to be discharged. A prescription for mineral oil is given, 1 ounce to be taken twice a day, as ordered.

LVIII

SHOCK AND HEMORRHAGE

Shock or collapse may be mental, physical, or both.

Mental shock is associated with violent emotional disturbances, the profoundness of which is sometimes governed by the mental stability of the person. Some of the causes may be fright, such as a narrow escape from an accident; sudden bad news; sights of a distressing nature; or sudden loud, explosive sounds (shell shock).

Physical shock is a sudden arrest of the bodily functions causing vital depression and prostration, due to vaso-motor dilatation, which may result in death. It may follow extensive operations, when it is known as surgical shock. It may be produced by accidental injuries, with or without a loss of blood. Shock following extensive burns of the body may be aggravated by the pain on the sensory nerve endings in the skin, since all forms of pain increase shock.

Signs of shock

The pulse is weak, rapid, irregular and compressible.

The respiration is shallow and thoracic.

The temperature is subnormal.

The skin is cold and clammy.

The face is pale or dusky, with dull, apathetic expression, nostrils pinched, eyelids drooping, eyes rolled up.

There may be vomiting, and in general there is extreme prostration.

Signs of shock with hemorrhage

When shock is complicated by internal hemorrhage the pulse gradually increases in rate. The blood pressure falls in proportion to the amount of blood lost.

There is hunger for air, with gasping and exhaustion.

The temperature is subnormal, the skin cold and clammy, with cold extremities.

The expression is anxious, sometimes alert. As the condition grows more serious the pupils of the eyes are dilated.

There is thirst and restlessness, pushing off the bedclothing.

In case of an external or visible hemorrhage, pressure is immediately applied.

If an extremity is affected, a tourniquet is used. (See page 131.)

In bleeding below the wrist make pressure at the wrist; in the arm, pressure above the elbow; in the leg, follow the same order, and the part elevated on pillows.

General nursing care

The nurse should move quickly but quietly, assuming an air of assurance, and not that of anxiety, while in the presence of the patient.

The nursing care and prescribed treatment are directed towards the conservation of body heat, the starting up of vaso-motor activities, and relief of pain if present.

External treatment

Removal of damp clothing without exposure.

Warm blanket next to skin.

Surround with protected hot water bags at 115° F., one in the region of heart. Avoid sweating the patient.

Remove pillows. Place one upright against head of bed.

Elevate foot of bed.

Extremities may be bandaged to lessen the circulation circuit and thereby increase blood supply to vital organs.

Indirect circulation of fresh air.

Quiet. Morphine is usually ordered in cases of hemorrhage to allay anxiety and stop restlessness.

Internal treatment

100 c.c. of 15% saline infusion to raise blood pressure.

Blood transfusion may be indicated.

Prescribed treatment

If shock following operation is not due to hemorrhage, more active stimulation is prescribed and all possible avenues are employed for treatment.

By rectum, shock enema

black coffee, 2 ounces
brandy, 2 ounces
salt solution, 2 ounces
temperature, 110° F.

To be given to patient, without regard to position, under blankets and with as little disturbance as possible. In some cases the brandy is omitted and the salt solution increased to make up a total of 6 ounces.

Tap water or saline solution may be prescribed, usually 1 pint, at 110° F., every 3 or 4 hours.

By hypodermoclysis, or intravenously

Saline solutions are used, sometimes combined with adrenalin chloride, when given intravenously.

Subcutaneously

Caffein sodium salicylate, grains 3–4.

Camphorated oil, 20%, 15 minims, intramuscularly, as a rule into the glutei muscle.

By mouth

Sips of hot water, black coffee or tea, or teaspoon doses of aromatic spirits of ammonia, 1 dram to a half-glass of hot water.

By inhalation

Smelling salts.

For failing respirations, oxygen.

In extreme cases, artificial respiration.

Delayed shock

Shock, which may appear an hour or two following an operation, especially that of laparotomy, or in a case of suspected internal injuries, is of serious importance and is indicative of hemorrhage. If suspected, report at once and carry out the same preliminaries as those in the external treatment of shock. In addition, an ice cap may be applied to the abdominal surface.

All internal stimulation previously prescribed should be withheld until further advice, and nothing given by mouth. For the comfort of the patient, his lips could be kept moist with water or a single layer of wet gauze placed over his mouth, or his mouth washed out.

If a case of amputation or of abdominal surgery, sterile materials for a dressing should be in readiness for the doctor.

Blood transfusion is done as a rule when bleeding has stopped, or as a supportive measure before an operation.

LXIX

HYPODERMOCLYSIS

This operation is the quick introduction of fluids through the skin into the connective tissue by means of large, hollow needles. The subpectoral region is preferable because of more space.

Purpose

For the infusion of salines in surgical shock and hemorrhage.

To supplement the fluid intake by the patient when insufficient.

To dilute the blood before and after operation as a measure against acidosis, in conditions of abdominal sepsis, and in the toxemia of uremia.

Equipment

shoulder blanket
tray set with
  2 sterile towels
  2 packages of sterile gauze
  adhesive plaster
  tincture iodine, 3½%
  novocaine, 1%
  2 c.c. syringe

The remainder of the sterile supplies are brought to the ward from the operating room by the doctor, and consist of: a flask of sterile solution, 100° F., 2 as-

pirating needles, a 2-liter irrigating can fully equipped with 4 feet of rubber tubing attached to glass Y-shaped tube. To each branch of the Y is another extension of tubing about 18 inches long for the attachment of the aspirating needles later.

Region of injection

Usually in the body where the folds of the skin may be readily picked up with the fingers when inserting the needle; as a rule, the site under the subpectoral muscle, in anterior axillary line. It is important to put the needle under the muscle and not into it. Sometimes into the thigh and into the peritoneal cavity in the case of children.

Procedures

While the doctor scrubs his hands the nurse prepares the patient by folding the bedclothing and nightgown out of the way. If a subpectoral infusion, the nightgown is removed and the patient protected with a shoulder blanket, over which is placed a sterile towel; both are tucked back out of the way when the doctor is ready for the operation. The flask of solution is emptied into the sterile irrigating can, which is suspended at the head of the bed, about 3 feet above the mattress. The tube is tested, air expelled, and the tubing clamped. The aspirating needles are then attached.

The doctor does the local disinfection of the skin with iodine, which is applied with a sterile sponge over the site of the proposed injection, and then injects

the novocaine. Sometimes a prescribed amount of novocaine is placed in the saline solution, so that the patient is not submitted to unnecessary pain from repeated introductions of needle. If the patient is still under the effect of an anesthetic or otherwise unconscious to pain, the intradermal novocaine would be omitted.

When ready to give the infusion, a little of the solution is run through the needles, then the muscle at the site of operation is firmly grasped, and the aspirating needle is forcibly thrust through the skin into the connective tissue. If a subpectoral infusion, one needle is used on each side, and the solution allowed to flow quite rapidly. The nurse must watch the solution within the can, and notify the doctor when the solution approaches the prescribed line of the graduated scale, so that the tubing may be clamped to avoid the danger of air in the tissues. The amount given to adults is usually 1000 c.c. (32 ounces); for infants and children, 250–500 c.c. (8–16 ounces). If there is much bulging of the skin, owing to slow absorption on one side more than the other, the rubber extension of the Y tube is clamped off and a pause is made. The infusion is resumed as soon as absorption takes place. In some cases it may be necessary to manipulate the swelling gently with the hand from the point of injection to the periphery, or change the position of the needle.

On completion of the operation, as each needle is withdrawn, a sterile sponge is applied over the point of puncture and held in place with two adhesive strips.

To relieve the painful tenseness following infusions, applications of moist heat may be used. Often 25–30 c.c.

novocaine, 1%, is added to the solution to diminish the pain due to distention.

Following the operation, the amount and nature of solution used should be noted, also the patient's pulse and general condition.

Infusions are given also directly from the sterile flask as it is taken from the thermostat. There may be less danger of infection than from the pouring of the solution from one utensil into the other, even if both utensils are sterile, because of contact with the air while pouring. The progress of the solution as it runs out can be better observed also.

LX

INTRAVENOUS INFUSION

An intravenous infusion is the administration into a vein of a sterile solution, usually an isotonic or 6% saline solution, given primarily for its bulk of fluid.

Purpose

To stimulate circulation in cases of surgical shock.

For its temporary effect until compatible blood can be obtained in cases of severe hemorrhage, when the loss is so great that a transfusion is indicated.

To aid in the dilution and elimination of toxins in septicemia, uremia, or eclampsia. In eclampsia the infusion is frequently preceded by bleeding (see Venesection, page 388).

In cases of dehydration from high fever or prolonged vomiting and diarrhea, particularly if attended by acidosis, the body fluids may be replaced by an infusion of dextrose, 5% to 10% in salt solution, because it furnishes a readily assimilable amount of fluid especially of value in combating acidosis and for its caloric value. The glucose solution on heating, as autoclaving, breaks down to a certain extent and produces acid. It breaks down also, but less rapidly, in a warm room. The buffer solution is a mixture of mono- and di-sodium phosphates of the same degree of alkalinity as the blood. It can take up a large amount of acid without becoming more than a very little more acid. 10 c.c. of the buffer is

added to 2 liters or 1000 c.c. of the glucose just before use, to take up the acid that has formed and make the whole solution the same alkalinity as the blood. It should not be added until the glucose is about to be used, as the glucose does not keep so well. For intravenous or subcutaneous injection only chemically pure dextrose should be used.

Methods

Infusions may be done by two methods: first, by gravitation; second, by injection, using the three-way stopcock and syringe.

First method

Equipment

sterile half sheet
2 sterile towels
2 packages of sterile gauze sponges
bowl of soap solution } for preparation
bowl of 70% alcohol } of the arm
500 c.c. flask of sterile saline solution, 112°–115° F.
sterile 2-liter irrigating can with sterile rubber tubing about 3 feet long and long glass connecting tube
test tubes with sterile intravenous needles
2 c.c. syringe with novocaine
scalpel and small forceps, should the vein be too small for needles
adhesive tape
flexible collodion and applicator
empty sterile flask for a mixer if solution should be too hot

Procedure

With the patient's arm supinated (palm upward), the bend of the elbow and surrounding parts are cleansed and wrapped in a sterile towel. The table is prepared and brought close to the bedside.

The irrigating can and tubing are released from their sterile coverings and suspended 2 feet or more above the mattress. The saline solution is poured from the flask into the irrigating can. The patient's arm is extended on the table above the sterile sheet and towel, and the tourniquet applied in the usual way, with light pressure.

The intravenous needle is attached, the clamp on the tubing released, and a little of the saline solution is allowed to run out of the needle, when it is introduced into the median basilic or median cephalic vein, with little apparent discomfort to the patient, *i.e.*, if the needle is sharp. When the needle is in position the tourniquet is removed. The solution should be given no faster than it can be absorbed, and the flow may be regulated by changing the elevation of the can.

The amount of solution administered is indicated by the falling fluid level, and the scale inside of the irrigating can. This observation is important, because if the level of the solution should fall below the end of the tube it would result in the introduction of air into the vein, which may cause air embolism. The glass tube, also, is watched for air bubbles. When the desired amount of solution is introduced, usually about 500 c.c., the tubing is clamped and the needle quickly withdrawn. Quick pressure is made over the puncture

with a sponge, which is held in place with adhesive tape, or small punctures are covered with flexible collodion.

Second method

Equipment

In place of the elevated irrigating can and tubing, the second method calls for slow injection of the saline solution into the vein by the use of a syringe, three-way stopcock, and intravenous needle. The remainder of the equipment is the same as that used in the first method.

Procedure

The 500 c.c flask of sterile saline solution is placed on the sterile table, and the three leads from the stopcock are joined by rubber tube connections with the long glass connecting tube in the flask, the 30 c.c. syringe, and intravenous needle, respectively.

The tubing to the syringe is usually shorter than that to the needle and flask. By means of the three-way stopcock, communication may be established first between the syringe and flask, and then between the syringe and intravenous needle. Thus the infusion is given by filling the syringe from the flask, and then, after turning the stopcock, the syringe is slowly emptied into the vein. When the syringe is empty, communication with the flask is reëstablished by turning the stopcock back to its original position and the syringe may be refilled. A record is kept of the amount introduced, and the procedure is continued until the desired amount is given to the patient.

For either gravitation or syringe method the tubing must be filled with fluid before entering the vein, to avoid the dangers of air embolism. All apparatus used in this operation should be sterile.

The puncture wound is covered in the usual way with adhesive tape and the patient made comfortable.

LXI

TRANSFUSION OF BLOOD

Transfusion is an operation for the purpose of transferring blood from the circulation of one person to that of another in order to restore a depletion of the blood supply following a pathological or traumatic hemorrhage, or to help in the regeneration of the red blood corpuscles. Transfusion is done in such cases as hemophilia, purpura hemorrhagica, primary anemia, bleeding gastric ulcers, hemoptysis, hemorrhage of the new born. It is done also in cases of poisoning, as from benzol or carbon monoxide. In surgery, preoperative transfusions are done in cases of severe jaundice when the coagulation time of the blood is slow, and to prevent shock in traumatic amputation or severe injuries and burns; post-operative transfusions are done in shock and hemorrhage.

Methods

The direct method. The artery of the donor is connected with the vein of the patient by a small cannula. This method is rarely used now.

The indirect method. The blood is removed from the vein of the donor, not in immediate connection, and transferred to the vein of the recipient.

Blood grouping

In some hospitals a list of suitable donors is kept on file, who, for remuneration, are willing to act as sub-

jects for transfusion. Each donor must be indirectly grouped, have a negative Wassermann reaction, a negative venereal history, and be free from malaria. In case of any recent infection, he undergoes an examination before transfusion. The recipient's serum is then directly grouped with the donor's corpuscles to avoid agglutination or clumping following transfusion. "If both tests are negative, it indicates that the two individuals belong to compatible groups and that their blood is suitable for transfusion."[1] If not an emergency case, a light diet is given the day of operation. The patient's red count and hemoglobin are taken.

Whole blood transfusion

Equipment

cocaine, ½%, or novocaine, 1%
2 c.c. syringe and needle
sodium citrate, 2%
warm saline solution, 6%, to put in veins
cold saline solution, to rinse syringes
7 glass 30 c.c. syringes
3 transfusion needles with pistons (Vincent)
short lengths of rubber tubing to fit syringes and transfusion needles
pair scissors
4 towel clips
sterile tourniquet
sphygmomanometer
4 half sheets
package (5) sterile towels

[1] "Transfusion of Blood," by George R. Minot, M.D., and Roger I. Lee, M.D.

3 gowns
package sterile sponges
2 round basins
square basin
iodine
alcohol

Procedure

In addition to the doctor and his assistant there should be a sterile nurse and an unsterile nurse or orderly, to wait upon the others.

The donor and the patient are placed on trucks, reassured by the nurse, made comfortable and kept quiet. The nurse's table stands between the trucks at the head. A sphygmomanometer is adjusted to the donor's arm. The doctor then swabs the donor's arm with full strength iodine well above and below the elbow. The arm and hand are draped with sterile towels and 2 sterile half sheets are draped over the donor. The patient is treated in the same manner, except that a sterile tourniquet is used instead of a sphygmomanometer.

The doctor proceeds to anesthetize the skin of patient and donor with novocaine or cocaine. The unsterile nurse now pumps the sphygmomanometer up to the donor's diastolic pressure, and maintains it at that point so that the arterial flow is not interfered with until the necessary amount of blood has been taken. The doctor and his assistant, simultaneously if possible, each inserts a needle in the vein of the donor and the recipient.

The doctor hands the filled syringe to his assistant, who, having inserted a needle in the patient's vein, has

removed the tourniquet, and is ready to inject the donor's blood into the recipient's vein.

The nurse hands the doctor a clean syringe, takes the used syringe, rinses it in cold salt solution, then in sodium citrate. It now is ready for use again. (The nurse must always have ready a syringe filled with warm salt solution to be injected into the patient's or donor's vein if there is any delay, such as occurs when the needles become plugged or come out of the vein.)

This procedure is carried out until 300–600 c.c. or more of blood have been given, depending on the age and the needs of the patient and the condition of the donor. The needle is withdrawn.

The iodine is then washed off with alcohol and a drop of collodion dropped on the needle wound.

The donor is frequently given a stimulant, and is advised to force fluids and to rest for a few hours.

The patient is returned to bed (ether bed preferably) and kept warm with blankets and given warm drinks. The necessary observations are made to detect any reaction, which should be treated symptomatically. A two hourly temperature is taken and recorded for twelve hours following transfusion, and any sign of chilliness and rise in temperature is to be reported to the doctor at once.

Paraffin tube transfusion

Equipment

3 Vincent tubes freshly paraffined, sterilized
3 surgical gowns
4 half sheets
4 towels

package sponges
sphygmomanometer
round basin for warm saline
square basin for sodium citrate to cleanse needles
2 blunt transfusion needles } with rubber connecting
4 sharp transfusion needles } tube
2 30 c.c. syringes, to put warm saline into the vein
2 Davidson bulbs
tourniquet
4 Elsberg hooks
6 mosquito snaps
2 pairs small scissors
2 pairs small forceps
4 towel clips
knife
tube, No. 0, plain catgut
small glass for novocaine
2 2 c.c. syringes with needles
4 Glover needles with No. 5 black silk
warm saline and citrate
novocaine, 1%
iodine

Procedure

The patient and donor are placed on trucks which are so arranged that sufficient space is left between for the operators. The sphygmomanometer is placed on the donor's arm, and iodine preparation is used on the arms of patient and donor, and both are draped with sterile towels. The novocaine is next injected, from 2 to 4 c.c. being the amount usually employed.

The vein is exposed by a small incision, and a double ligature of No. 0 plain catgut passed around it, the proximal ligature being tied in the donor, the distal in the recipient. The ligature which is not tied is used as a loop, traction on which serves to close the vein when the tube is not in place. The surgeon then picks up the vein and makes a cut in its wall with his small scissors. The Elsberg hooks are used to hold the walls of the vein apart if necessary, the Vincent tube is put into the vein of the donor, and the sphygmomanometer is pumped up to between 60 and 90.

In the meantime the sterile tourniquet has been applied to the patient's arm and the same procedure of cutting down on the vein carried out. The tube, when filled, is transferred to the patient, and the nurse then attaches the outflow end of the Davidson bulb onto the tube and pumps the blood into the vein. In cases where the vein is too small for the end of the tube, a blunt, hollow transfusion needle is used and the Vincent tube is placed in the end of it.

Note

In cases where there is a delay in getting the blood from the donor, warm saline solution is sometimes injected into the patient's arm while waiting.

Each Vincent tube holds about 250 c.c., and the amount of blood used varies according to conditions of patient and donor. The usual amount for an adult is from 2 to 3 tubes.

Black silk is used to sew up the incision, and a sterile dressing is applied.

When the operation is completed, the patient is put to bed between blankets. Note pulse and respiration. Watch for chills, rise in temperature, nausea, vomiting, and restlessness. A patient may have a chill following transfusion which may be due to slight incompatibility of the blood, and is not considered serious under these conditions, but it should be reported. In the meantime hot water bags and blankets should be applied.

TRANSFUSION OF INFANTS AND CHILDREN

Purpose

To replace blood lost, as in traumatic or post-operative conditions.

To stimulate bone marrow activity, as in the various forms of anemia or purpura.

To combat sepsis by increasing the antibodies of the blood, as in sinus thrombosis.

Indication for

Hemorrhage of the new born. Transfusion is of specific therapeutic value. Usually small quantities of blood (20–30 c.c.) are used at frequent intervals.

Secondary anemias.

Due to sepsis, *e.g.*, septic umbilicus most common.

Due to marasmic condition, usually found in children kept too long on a milk diet.

Hemophilia. Indicated only where there has been great loss of blood.

Purpura. A two-fold indication in this condition, as it not only replaces blood lost, but also increases the

number of blood platelets and thus increases the coagulation time of the blood.

Primary anemias. A rare condition in childhood, in which transfusion is the only therapeutic measure.

Acute hemorrhage, due to any cause, *i.e.*, trauma, postoperative, etc.

Methods

Intravenous

Paraffin Method. A tube that has been paraffined in the inside is used. Blood is drawn from donor and injected into recipient as quickly as possible. This method requires at least one assistant.

Citrate Method. Blood is drawn in a syringe containing a citrate solution which prevents clotting. This method does not require the aid of an assistant.

Intramuscular. Used most frequently in small infants, as for hemorrhage of the new born.

Intraperitoneal. Used in older infants. Advantages: Less painful to the child and greater quantities may be given. Objections: Danger of abdominal adhesions due to the fibrin of the blood; danger of infection of the peritoneal cavity; danger of peritonitis from perforation of a viscus.

Technic

For *intravenous injection,* the technic is the same as for adults, namely, the donor's blood is first grouped with a stock serum (indirect grouping) to determine to which one of the four groups he belongs. If the

donor is found to belong to the same group as the recipient, the donor's blood is grouped with the patient's serum (direct grouping) to determine the compatibility of the donor's red blood cells with the patient's serum. Most frequently the jugular vein is selected.

In children below one year blood grouping is not necessary. Either parent can be donor for intravenous injection.

For *intramuscular* or *intraperitoneal* injection, any human blood may be used. The most frequent site for intramuscular injection is the gluteal region.

Anaphylaxic phenomena in children are very rare. Symptoms are the same as in adults, *i.e.,* labored respiration, clammy skin, dilatation of pupils, etc. Treatment is also the same as that for adults, namely, hot water bottles and blankets.

LXII

RECTAL SEEPAGE (PROTOCLYSIS)

Rectal seepage is commonly known as the "Murphy Drip," after the originator, the late Dr. John Benjamin Murphy of Chicago, although it is administered in various ways, not always in strict accordance with his methods.

This treatment is the slow percolation of fluid into the rectum for retention and absorption by the body tissues. Its chief use is when the patient cannot retain rectal taps, in such cases as sepsis of the peritoneal cavity. The seepage lessens the absorption of toxines by filling the tissues with water; increases elimination when the fluid intake is insufficient; dilutes the blood in such conditions as diabetic or uremic coma; allays thirst when nothing may be taken by mouth; and is a simple means of forcing fluids without disturbing the patient.

Solutions

For increase of body fluids, plain tap water or 0.6% saline solution is used.

In cases of acidosis, diabetic coma, or for sustenance, 5% to 10% glucose in a 0.6% saline solution.

If sodium bicarbonate is prescribed, drams 2–3 are given to a pint of saline solution.

Equipment

hopper towel
half sheet and rubber
enameled basin
enameled pitcher
pint graduate
bath thermometer
lubricant
thermos bottle and tubing
solution as prescribed

Method

The rate of drop per minute is usually prescribed according to pressure and amount of solution to be absorbed in a given time. The rate is generally 50 to 60 drops a minute, or between 2 and 3 gallons in 24 hours. When the bowels are distended, the fluids should be dropped more rapidly to counteract back pressure.

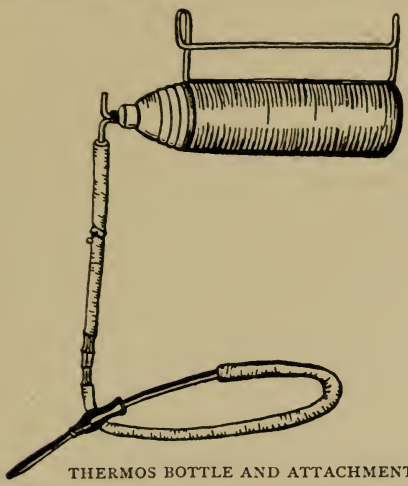
If retained, this treatment may be continuous over 3 or 4 days; on the other hand, if the rectum becomes irritated and leakage around the tube is evident, the patient is placed on intermittent seepage, in periods of 2 to 4 hours. The left-over fluid is always measured and deducted from the total amount, in order to record how much the patient has absorbed.

If patients are not allowed fluids by mouth, the lips should be thoroughly covered with cold cream and the mouth frequently swabbed.

In the case of a child, the arms should be kept outside of the bedclothing by arranging it snugly under the arms, and securing the edges of the sheet to the head of the bed with tape or bandage.

Thermos bottle seepage

Because of its heat retaining qualities, a quart thermos bottle serves as a substitute in the absence of regular apparatus. In place of the cork a large soft rubber stopper is used, perforated by 2 ¼-inch metal tubes.



THERMOS BOTTLE AND ATTACHMENT

These are bent at right angles, one up and the other down just outside of the cork. One serves as an air valve; the other, which is longer, dips into the solution within the bottle and acts as the supply tube. Its outside end is connected with the central tube of three rubber tubings about 5 feet long, one fitting within the other to aid in keeping the solution warm in its slow passage from the bottle to the patient. The tubing is interrupted 9 inches from its attachment by a cylindrical window, which encloses a set of graduated glass droppers, through which the drip can be

seen. It is regulated by a screw clamp attached to the tubing above.

A No. 22 French rectal catheter is connected with the central tubing by a small glass connecting tube. Eight inches from the tip of the catheter is a hard rubber self-retaining rectal tube, with an olive-shaped bulb, which fits between the internal and external sphincter ani.

Preparation

Owing to the slow dropping of the solution and the length of the tubing, the temperature should be 125° F., which will be not much more than 100° F. by the time it reaches the rectum. The thermos bottle is rinsed with hot water, and 28 ounces of the hot solution is poured in, which will permit sufficient air space in the bottle. The rubber stopper is inserted with the metal air valve upward, to prevent leakage. If there is any danger of the stopper becoming loose, secure it with a strip of adhesive tape over its top and extending down over the neck of the bottle. The thermos bottle and holder are hung in a horizontal position at the head of the bed. If the patient is in the dorsal position the bottle need not be elevated more than 12 or 18 inches above the mattress. If the patient is in Fowler's position, the bottle is suspended about 2 or 3 feet above the mattress, because greater pressure is required to aid retention and absorption of the solution.

In any case the receptacle should be high enough to promote sufficient pressure for absorption of the amount prescribed. Too great elevation may cause a flow too rapid for absorption and leakage may follow.

Regulation of seepage

A basin is placed on the floor. The clamp of the tubing is loosened and a little of the solution is run into the basin to warm the tubing and expel the air. This solution is measured later. By tightening the clamp the drip is controlled, the desired rate being obtained by observing the drops through the glass window and regulating them by the watch.

The introduction of the rectal catheter

The rectal bulb and catheter are lubricated and carried under the patient's thigh on the side nearest the thermos bottle. The catheter, including the rectal bulb, is carefully inserted into the rectum until the rim of the bulb fits snugly outside of the anal sphincter. Pressure should be made with the towel against the rectum for a minute or two until the patient gets accustomed to the sense of obstruction and the desire to force out catheter has subsided. In some cases it may be necessary to secure the outside extremity of the catheter to the back of the patient's thigh with adhesive tape.

Hindrances to retention of seepage

The presence of feces or flatus in the rectum, for which a small enema may be given.

The doubling of the catheter in the rectum if too small in caliber.

Too rapid rate of drip, and leakage, regulated by lowering thermos bottle.

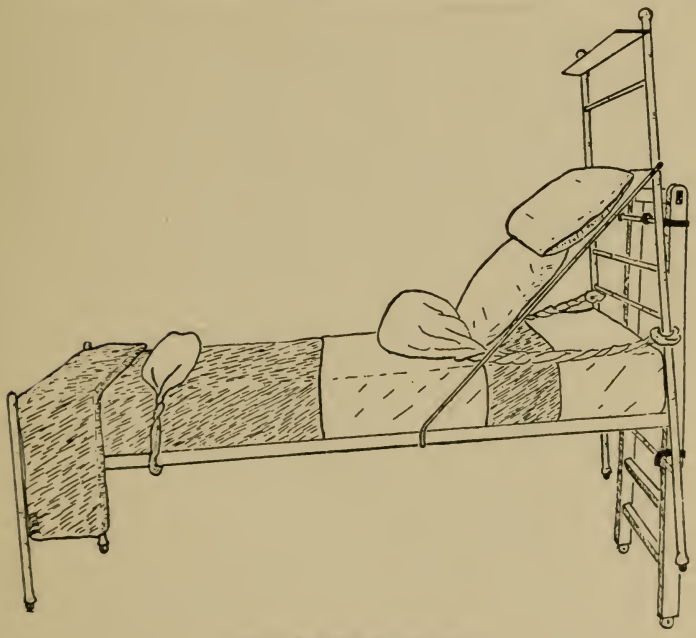
After care of thermos bottle and tubing

The bottle is washed inside and out with soapsuds, then rinsed in clear water and dried. The tubing and glass connecting tube are thoroughly drained. The tubing is washed off with hot suds. The catheter and rectal bulb are washed in cold water and hot suds. They are then soaked for a few minutes in hot 2% sylpho-nathol solution, as boiling may damage the hard rubber bulb, which must not be removed from the catheter for any purpose, since it is most difficult to replace. When the thermos bottle and apparatus are clean and dry, they are returned to the pharmacy ready for use.

LXIII

FOWLER'S POSITION

Fowler's position, named after the late Dr. George Ryerson Fowler of Chicago, the originator, is that of elevation of the patient's head 18 or 20 inches higher than his feet, bringing him into a sitting position. The purpose of the position is to facilitate gravitation of pus to the pelvis, on the theory that it may form a localized abscess there, where absorption of toxic mate-



BED ON FOWLER FRAME

rials is less than in the upper abdomen, owing to the distribution of the lymphatics; the nearer the diaphragm, the more rapid the absorption.

The bed is prepared before the arrival of the patient, and made as an ether bed. The head of the bed is elevated on an adjustable wooden frame, supported by iron notches, or wooden blocks, or a wooden armchair may serve as a substitute. If the head of the bed is not adjustable a headrest is used, and in order to prevent the patient from slipping down, a pillow roll and sheet are placed under his knees to hold the flexed position. For additional comfort and support, a sheet is folded lengthwise to the width of 12 inches or more and stretched tightly across the mattress and tied on each side of the bed. A small woolen blanket is next folded and made into a tight roll and inserted within the folds of the sheet, which serves as a brace for the patient's feet. A shoulder blanket is applied for protection and comfort.

LXIV

SURGICAL DRESSINGS

A surgical dressing is designed for use in active surgery in caring for the patient's wounds following operation, and for accidental injuries. The material in common use is a loosely woven cotton fabric called surgical gauze, which is purchased in bolts and from which many of the surgical supplies are made.

Small gauze sponges are most commonly used in the operating room and wards. They are made with the gauze cutter by cutting a bolt of gauze into yard squares of two thicknesses. These are recut into pieces 18 by 12 inches; thus 6 sponges are obtained from each yard. The sponges are made by turning in the rough edges, then each corner. About 2½ inches is folded over on each side and these folds brought together, then end to end in the same fashion. When completed, the sponge should be 4 by 2½ inches.

When gauze is made into surgical sponges they are carefully counted, neatly stacked, then enveloped and secured in unbleached cotton covers or packed without coverings in metal drums, ready for sterilization. To be sterilized, they are placed in a double jacketed copper autoclave, or sterilizer, and are exposed to steam heat at 15 pounds pressure, which equals about 250° F., for forty minutes on each of two consecutive days. This is called fractional sterilization, and this method is used for the destruction of bacteria and the more highly resistant spores.

Besides the surgical sponges, dressings may consist of gauze pads and large gauze handkerchiefs, a yard square, with their raw edges folded in, put up in packages to be used in abdominal surgery to protect and wall off the field of operation.

Other materials, such as absorbent cotton, sheet wadding, and picked cotton, are made into pads and are used to reinforce dressings.

Sterile gauze and pads are applied for protection from outside contact and air, for pressure, and for absorption of serum or pus in open or discharging wounds. A light packing or drains are introduced into the wound when it is necessary to keep the edges apart, or to facilitate drainage. At the time of operation cigarette drains are sometimes used, made by surrounding a narrow gauze sponge with a covering of thin rubber tissue or tubing. In ward dressings the rubber tissue may be used alone, or a bias strip of gauze cut from the corner of a sterile sponge, freed from its thread ravellings, and the raw edges folded into a smooth point.

Chemical agents may be combined with a surgical dressing and applied locally for stimulation to a slowly healing wound or for disinfection.

Methods of holding dressings in place are governed by the location of the wound. Dressings of the thorax are held by adhesive strips and cotton binders, as are those of the abdomen also, except the scultetus binder, which is used more commonly than the straight binder in cases of obese adults, as it affords better support. These binders are held down on each side by a perineal strap. Dressings of the head and extremities are held

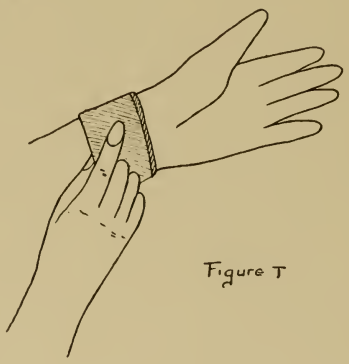
in place with cotton rollers and bandages; those between the thighs, with T-binders.

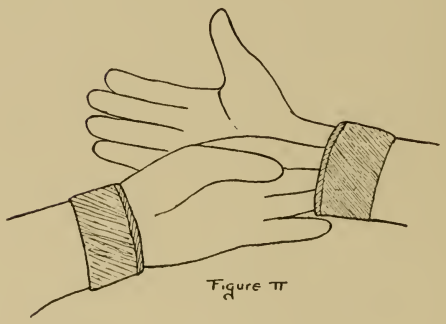
Procedure in doing an abdominal dressing without assistance

Turn down the upper bedclothing to the crest of the pubes; place the patient's arms comfortably out of the way; turn the nightgown up as far as the sternum, supporting the elbows within the folded nightgown, which is tucked out of the way under the edges of the lower pillow. Unpin binder; remove perineal straps; roll the nearer side of the binder close to the patient's side. Have a basin or bag ready to receive soiled dressings. Remove outside pad and dressing, or if a discharging wound, remove later with forceps. Place a dressing towel over the folded nightgown and tuck the edges of the towel under it, leaving an unobstructed field. Lay the sterile towel containing the instruments on the patient below the pubes. Open the towel, which will expose the instruments to view. Turn out from their coverings several packages of gauze sponges and a pad, if needed, upon the sterile towel. Cover the instruments and dressings with half of the towel, not forgetting to turn back its selvage edge slightly to permit the later introduction of the nurse's clean hand between the folds. Loosen the towel about the sterile rubber gloves on the tray.

The usual scrub up is now done as for other aseptic procedures already mentioned (see page 169). Put on gloves. If sterile, the first glove is held by the turned back cuff, while the other hand is thrust into the glove.

The other glove is picked up with the gloved hand beneath the turned down cuff and drawn over the hand, when the cuffs are carefully turned from their underside over the wrists.





METHOD OF PUTTING ON STERILE GLOVES

Disinfect forceps in antiseptic alcohol, 70%. If an open wound, cleanse by using sterile gauze wrung out of

a mild disinfectant, generally boric solution, using forceps and curved half-lengths. Sponge away from edge of wound, using the same side of sponge only once. If a drainage case, the wick may be changed.

Cover wound with surgical gauze, over which is placed a sterile pad. Adhesive strips may be applied to hold the dressings in place. The towel with the instruments is placed on the tray; do not put in with soiled dressings.

The patient's back should be bathed with either soap and water or bathing solution, and a little powder may be sprinkled on the binder, which is now put on and the soiled binder pushed under the patient at the same time. The clean binder is adjusted, pinned, and the perineal straps applied.

Remove gloves by turning down the cuff and grasping cuff and glove together, to prevent tearing.

Dressings of the thoracic region

In breast surgery the dressing may be large or small, since these operations may vary from the removal of a small benign tumor to that of amputation for carcinoma with a complete dissection of axilla. Protect the patient from exposure by using a small blanket over the opposite shoulder. Spread sterile towels around the seat of operation.

Following the more simple operations of the breast, if the patient's condition warrants, the dressing is usually not disturbed until time for removal of stitches, 5–8 days. Before putting on the binder the axillary spaces should be bathed and powdered and pads of absorbent cotton inserted to prevent chafing.

After care of instruments

Instruments are gathered up and counted.

Place in enameled basin and wash thoroughly in cold water.

Wash in hot suds and scrub with fine sand soap, being especially careful of joints and grooved surfaces of instruments.

Rinse thoroughly in hot water.

Place on tray of sterilizer and lower into boiling water, sufficient to cover them. Boil for ten minutes.

Sharp-edged instruments should never go in with the general lot in boiling, for fear of damaging delicate edges. They should be wrapped in gauze and boiled separately.

Remove tray from sterilizer and drain. Dry with double sterile towel, avoiding contact, and place in second sterile towel.

Fold up carefully and put away ready for use.

All jointed instruments should be oiled at regular intervals.

Cleansing of utensils

All enameled ware used should be rinsed in cold water, then scrubbed with fine sand soap and sterilized five minutes.

Rubber drainage tubes should be cleansed with cold water and manipulated to detach any adherent discharge. Wash in hot soapy water and boil in weak salt solution for five minutes. Put in a separate jar of disinfectant to be used for same patient, if necessary. If not needed, destroy.

Care of rubber gloves

Wash inside and out in cold water, then in warm, soapy water, and test for leakage. Boil five minutes. Dry with sterile towel. Powder inside and out with sterile powder. Powder should never be shaken into rubber gloves. The wearer's hands perspire in the gloves, and the result after shaking in powder is a pasty deposit under the finger nails and on the tips of the fingers, interfering with the sense of touch.

The gloves should be placed on a sterile towel and the powder should be applied evenly, or stroked on from wrist to finger tips, by means of a dry sterile gauze sponge. When one side is completed the glove is turned, and the inside done in the same way. This method leaves the gloves with a satin-like smoothness inside and out. Turn back cuffs fully 2 inches. Make sure that gloves are matched. Put away in a sterile towel or glove case ready for use.

Method of mending

Test the gloves by filling with water under pressure.

The gloves should be clean and dry. Cut out a patch the size wanted from a discarded glove or from a piece of rubber dam. Stretch the glove over a test tube, if a finger is to be mended, or otherwise over some smooth, hard surface.

Apply rubber cement around the edges of the hole and as far as the patch extends, then press on the patch, which should be larger than the place to be mended.

If the cement is applied evenly and the patch held slightly stretched until the cement takes hold, the glove will stand sterilizing without loosening the patch.

Care of dry goods

Sponge covers are saved if clean. Soiled gauze is put in gauze pail. Broken packages of clean gauze are saved to be resterilized. Towels are put in laundry bag. The dressing tray is washed with soap and water and dried.

Points to remember

In getting out a dressing it should be complete in every respect, unless the doctor calls for something unusual, then see that it is added to the dressing next time.

In the preparation of solutions care must be exercised in wiping the rim of the bottles before pouring out the solutions.

In minor operations on the ward the necessary instruments are brought from the operating room.

Knives which may be used for minor operations on the ward are sterilized by placing in 5% carbolic acid or by boiling in oil ten minutes in the operating room.

When assisting at a bedside dressing do not reach over the sterile field of operation.

Have everything in readiness before scrubbing the hands. Do not leave sterile supplies open to the air. Cover until ready to use.

A bowl or basin holding a sterile solution should not be grasped with the thumb over its rim.

In removing sterile supplies from a jar the cover should be held in one hand by a sterile sponge and supplies removed with sterile forceps in the other. Otherwise the cover should be placed top down on the table.

In removing adhesive strips, the simple stretching of the skin with one hand and removal of adhesive with the other is usually sufficient; otherwise benzine or ether may be used, although the latter may sometimes be objectionable to the patient.

If an open wound, remove the dressing with the line of incision. If adherent to the wound, moisten with a sterile solution. Care should be exercised in removing wicks that become adherent, to avoid breaking down the process of repair by damaging the granulations. Apply warm sterile solution, then gradually loosen with forceps.

Warn patient not to explore dressings if for any reason he is left alone with the binder unpinned.

A nurse should never interfere with a dressing after operation unless ordered to do so by the surgeon.

Following removal of stitches, special attention should be given to the binder, to afford sufficient support.

In cleansing a wound sponge away from the edge, lest septic material from the skin surface be swept in.

In replacing a wick or drainage tube it should be grasped parallel with the end of the forceps or curved half-lengths and carried to the bottom of the wound, the remainder above the surface cut off about 1 inch above the skin, or loosely packed about the mouth of the wound; otherwise it may act as a plug and prevent drainage.

In open wounds the dressing should be sufficient to prevent leakage. Dressings which have stained through the binder should be changed and the dressing reinforced. If there is blood, report.

Instruments should be cleansed and sterilized immediately on completion of dressing. They should not be left standing in water after boiling, but should be drained and dried thoroughly. To prevent rusting of instruments in sterilizing, sodium bicarbonate to make 1% solution is used.

When putting away in the dressing towel the handles of instruments should be in the same direction.

BINDERS AND THEIR APPLICATION IN SURGERY

Straight binders are used in general surgery of the abdomen, chest, and breast, also in obstetrics, for the purpose of holding dressings in place, and for support.

These binders are made of unbleached cotton cloth or Canton flannel. When completed, they should measure 12–13 inches wide and 40 inches long.

Application to the abdomen

One-half of the binder is rolled and slipped under the patient and adjusted on each side over the hips, and below the symphysis pubis in front. One end of the binder is evenly folded under a few inches, lapped over the opposite end, and both are pinned firmly with a large safety pin at the lower edge. From that point a straight line is made to the upper edge of the binder and pinned, and a third pin secures the binder in the middle. Additional pins are added at equal distances above and below the center; usually nine pins in all. The fullness left over is taken up in darts on each side, which are fitted closely to the patient's body. When

pinning the first side equal allowance should be made for the dart on the opposite side, so that equal pressure of the binder is maintained. The pins are applied in back-stitch fashion, giving support and firmness. Finally, perineal straps are applied.

In applying a binder to an obstetrical patient, the pins are started from the top of the binder, ending at the bottom, to assist in holding the fundus of the uterus in position.

Scultetus bandage

Like the straight binder, this is applied to keep a dressing in place and for support. It is used where there may be large abdominal wounds and in obese patients with flabby abdominal muscles, as it is capable of giving greater support than the straight binder.

This binder is made of 5 Canton flannel strips 5 inches wide, which overlap each other to the extent of 2 inches, and is 48 inches long. It is reinforced by being stitched to an extra piece of Canton flannel 9 inches wide and 15 inches deep, which forms the back part of swathe, the overlapping strips or tails coming from each side. Before applying, it should be so arranged that the first underlying strip or tail should be the lower edge of the binder. It is rolled halfway and slipped under the patient. The 2 opposite strips are brought straight across and fastened firmly over the pelvis with 3 safety pins. The next 3 are crossed obliquely, inclining upward, over the abdomen, crossing each other in the center until the fifth strips are reached, which are the final ones. They are fastened straight across and

secured with safety pins. Pins are applied down the center, fastening each cross.

If a T-bandage is not attached to this binder perineal straps are used and applied, as in the case of a straight binder. As a rule, to have this binder evenly and more firmly applied, a nurse should have an assistant.

Application to the chest

Following operations of the thoracic cavity, as in empyema, where rubber drainage tubes are used, if a straight binder is worn it is adjusted under the patient's arms, and the 2 ends are pinned together over the site of the wound, so that the tubes may be carried through the vent in the binder, between the safety pins, convenient for interval irrrigations. See Carrell and Dakin's dressings, page 472.

The binder is held in by making a V of a perineal strap, the point of which is pinned to the edge of the binder between the patient's shoulders, and the 2 ends are brought over either shoulder and pinned to the binder in front.

Application to the breasts

Following a simple operation of the breast, as that of the removal of a benign tumor, the binder is pinned down the front in a straight line, and the extra fullness is disposed of by taking a dart in the binder under each breast. Perineal straps, or a folded dressing towel, serve to hold the binder in place.

For extra support and immobilization following radical operations on the breast for malignancy, 2 binders

are worn. The first binder is applied as usual, the arm space on the unaffected side being powdered and padded. A second binder is rolled halfway and slipped under the patient's back. The forearm on the affected side is held at right angles, and the end of the binder is carried over the upper arm. The other end of the binder is carried under the opposite arm as high as the axillary space and the 2 ends of the binder meet and are pinned from the shoulder to the elbow of the affected side. In addition, the forearm is supported with a wrist sling made of a dressing towel folded 6 inches wide, one end of which is pinned about the patient's wrist, the other end carried over the shoulder on that side and pinned to the front and back edges of the binder.

After 24 hours the outside binder is loosened and the arm is gently exercised and rubbed, from the elbow down. The outside binder is usually removed 3 or 4 days after operation, but the wrist sling is left on.

Perineal straps

Perineal straps serve the purpose of holding the binder firmly in place for the protection of the wound and dressing.

The straps are made of several thicknesses of bird's-eye cotton or Canton flannel about 2 inches wide and 27 inches long. The method of application depends on the region of the surgical wound; if in the abdomen, each strap is pinned to the extreme lower edge of the binder behind, brought below the prominence of the buttock, forward over the groin, and pinned to the

lower edge of the binder in front, with the patient's leg extended. The strap and binder should be under tension when pinned, and to avoid hurting the patient, the binder at its lower edge should be pulled outward or away from the wound, then downwards, to meet the strap. Any extra length of the strap should be folded under itself and pinned to the binder higher up, out of the way.

The straps should be changed at least once a day. To avoid soiling in perineal bathing and when a douche, or enema, or any other such treatment is being given, they should be unpinned in front and turned back out of the way, and be immediately replaced when through. Under no circumstances should there be less than two straps when used to hold the binder down, especially in low abdominal incisions, as in appendectomy.

When the wound is higher up, or in the epigastric region, the straps are applied to the upper edges of the binder behind the patient's shoulders, brought forward and pinned to the edges of the binder in front firmly, to prevent slipping out of place and wound exposure.

T-binders

These binders are made in the shape of the letter T, the cross section of the letter making the belt. They are used to hold dressings and pads in place following rectal or perineal operations. They are made of the same materials as binders, of double thickness, and measure in width 8 inches; in length, 35 inches. The belt is made from cotton cloth 3 inches in width and 43 inches in length.

Those used on male patients are the same width, but are divided within 6 inches of the belt.

A T-binder is applied by rolling the belt halfway and slipping the rolled part under the patient. The 2 ends of the belt are crossed in front, girdle fashion, and pinned with a large safety pin. The remainder of the T is brought up between the patient's thighs to fit snugly, then carried under and over the belt, and the end folded in a point and pinned securely with a large safety pin upon itself beneath.

LXV

DAKIN'S SOLUTION AND CARREL METHOD OF TREATMENT OF WOUNDS

Purpose

Dakin's solution combined with the careful Carrel technic is of especial value in cases of deep-seated infection, as osteomyelitis and empyema. It is very useful, also, in open uninfected wounds, to prevent development of infection, as in gunshot wounds, compound fractures, extensive burns, etc. The wound may be bathed constantly by the non-irritative antiseptic solution without retarding healing until the wound becomes sterile. Bacterial count and cultures are taken under the microscope at intervals of 2 or 3 days. By the smear, the kind of bacteria present can be found; by the culture, which is incubated for 12 hours, the number of bacteria are determined.

Preparation

A concentrated Dakin's solution is formed by mixing in water a solution of calcium hypochlorite and a solution of sodium carbonate. A volume of this solution is neutralized with hydrochloric acid and is then diluted to a .4 or .5% solution, at which per cent the necessary amount of chlorine is given off. The per cent of solution necessary to give off the desired amount of chlorine has to be worked out chemically. Soda bicarbonate is added to neutralize the solution, if acid, and to precipitate the calcium carbonate which makes Dakin's solution alkaline.

Dakin's solution deteriorates in heat and light, and should be kept in dark bottles. If kept in white bottles, potassium permanganate is added for coloring to prevent deterioration.

Equipment

pair surgical scissors
2 pairs long, straight forceps
2 pairs half lengths
flask warm sterile normal saline solution
5-pint bottle Dakin's solution
2 glass bowls { (1) saline solution (2) Dakin's solution
20 c.c. glass syringe
10 c.c. glass syringe
sterile instillation or Dakin's tubes
various sized glass distributors or by-way tubes, to which instillation tubes are attached
glass connecting tubes with corresponding rubber tubing
500 c.c. dark-brown irrigating bottle and wooden support for Dakin's solution
can sterile cotton pledgets
jar sterile boric ointment
jar 95% alcohol
jar benzine
metal box of sterile vaseline compresses
bottle tincture of iodine
stick of lunar caustic
sterile surgical sponges
jar sterile safety pins

6 jars sterile absorbent fluffs
sterile sweep in lysol, to remove instruments, fluffs, etc., from sterile cans
jar of sterile soap solution
kidney basin

SURGICAL CARRIAGE FOR CARREL–DAKIN DRESSING

2 enameled basins
sterile towels
large picked cotton pads
washed gauze
bandages

binders, scultetus and straight
adhesive tape of various widths
safety pins, large and small
rubber protectors

A special surgical carriage is used for the Carrel-Dakin dressings.

Dressing a wound of the thoracic cavity (empyema)

Morning dressing. The surgical carriage is taken to the patient's bedside. The bed is thoroughly screened. The patient, who is sitting up in bed, is prepared for his dressing.

The binder is taken off and the soiled dressing is removed with forceps. If one tube is used a rubber catheter projects from the wound, and is held in place with a sterile safety pin and two adhesive strips. The pus is drawn off with a 4-ounce glass syringe. Warm saline solution is then syringed into the wound and drawn off until it returns clear. It is then irrigated with the usual amount of Dakin's solution, according to the size of the cavity. The tube is clamped, the adhesive strips removed, and the skin about the wound cleansed with sterile pledgets dipped in sterile soap solution, followed by 70% alcohol, and fresh strips of adhesive are applied to hold the tube in place. Sterile gauze sponges, fluffed, are applied in such a manner as to surround the tube at its insertion to keep it from bending upon itself. An opening is made through the center of a picked cotton pad, and the clamp and tube are drawn through the opening and the binder applied

comfortably, pinned at the side from the edge on which protrude tube and clamp, convenient for 2-hourly irrigation with Dakin's solution, which is done for the remainder of the day and night.

Dressings are changed as necessary, usually twice a day. The end of the tube should be covered with a clean piece of gauze except when irrigating.

In irrigating, the syringe should be inserted into the tube before the clamp is removed, and the tube should be clamped before removal of the syringe, to prevent air entering the cavity.

In case of a rib resection, where there is an outflow tube, the cavity is syringed until the return is clear.

In some cases of empyema there may be a back and front thoracic wound containing several of these elastic tubes, when each in turn is attended to as in the case of the one tube. The scultetus binder will be found most convenient in such cases, as the end of the tubes with their clamps may be carried between the tails. Wind sterile sponge around the ends of the tubes to keep them clean.

Before application of sponges, Dakin's compresses are placed about the wound, close to the edges.

Dressing an open wound, osteomyelitis of the tibia

Carefully remove all dressing with the exception of large pads, which are laid open and which help to protect the bed. The instillation tubes should be cleaned out with Dakin's solution, using the 20 c.c. syringe until the solution runs out clear through the pin-hole per-

forations and all parts of the wound have been bathed with it. The wound is sponged dry about its edges with sterile pledgets of cotton held between the points of the forceps. The skin about the margin of the wound is washed with sterile neutral soap solution, and finally with alcohol, using sterile pledgets of cotton which are held in the forceps.

The sterile strips of Dakin's vaseline compress are now lifted out from the metal box with a sterile sweep, and carefully applied to the skin about the wound, from its margin to 3 or 4 inches beyond the wound. They are laid on smoothly so that they lie in direct contact with the skin, to protect it from the irritating action of the Dakin's solution. A heavy dressing of sterile gauze is applied and each leg is adjusted to a posterior wire splint. A large thick pad of picked cotton is applied to encircle the leg and wound, and pinned firmly together at its edges with the tubes protruding.

The irrigations are done either with a syringe or from a graduated glass reservoir, which is placed in its wooden rack above the wound. From this reservoir a rubber tube is connected with a glass distributing tube, which usually has four or more short branches or by-ways, to which are attached the rubber instillation tubes that convey the fluid into the wound. The connecting tube has a clamp for controlling the flow of solution.

LXVI

SURGICAL HAND OR FOOT SOAK

Purpose

The surgical hand and foot soak is a method of applying direct heat in the treatment of local infections of the hands or feet:

To relieve pain.

To reduce inflammation.

To disinfect and cleanse a suppurating wound before or following incision.

Equipment

cotton half sheet and rubber
rubber table cover
small gray blanket
sterile dressing towel
empty hot water bag slightly inflated
arm and foot tub
enameled basin to receive soiled dressing
sterile forceps
pair of rubber gloves
solution

If a moist dressing is to follow the soak, the following materials are added:

enameled basin containing:

sterile dressing towel	sling, if needed
sterile sheet wadding pad	enameled pail
poultice paper	enameled basin
half sheet of wadding	enameled pitcher
small safety pins	solution, as ordered

Procedure for hand soak

The patient is usually confined to bed, and, if able, sits up in bed, supported by pillows or a head rest. The half sheet and rubber are placed on the bed and across the patient's lap, to protect the bed. The infected hand is laid on the half sheet, and the dressing is unpinned, ready to be removed later.

Preparation of solution in tub

The prescribed solution is made ready: 1 to 2 gallons or more, usually boric solution, 2%, or normal saline solution, 0.6%, sylpho nathol, 1–600, or chlorinated soda 1–100 to 1–200; temperature, 110° to 115° F., or as hot as patient can bear.

The tub is placed on the bedside table or on the bed close to the patient on the side of the hand to be treated.

The dressing is now removed and the hand, evenly supported at wrist and elbow, is steadily lowered into the tub. The inflated hot water bag is placed over the edge of the tub for comfort and support of the arm.

The cover is put on the tub and reinforced with a doubled blanket to keep in the heat. In the absence of a cover a piece of rubber sheeting may be used, and a doubled blanket over the sheet.

If the soak is to be continued longer than half an hour, the solution should be replenished. If a continuous soak, the contents of the tub should be siphoned with a piece of rubber tubing, or bailed out, and filled as often as necessary, or every half-hour, with hot solution, as heat plays an important part in this treat-

ment. The fresh solution should be of the same strength as that removed.

Preparation of dressing

The sterile towel is opened and spread over the pail.

The sterile pad is removed from its cover and placed in the towel and covered.

Measure in a pint graduate sufficient solution to make 1 quart when water is added. The hot solution of required strength is now mixed in the pitcher, ready to be used later.

Removal of hand from tub

The tub is uncovered.

The second sterile towel is spread on the patient's lap, over half sheet and rubber.

The patient's hand is carefully and slowly lifted out of the tub, placed on one end of the sterile towel, and covered with the other end. The tub is removed.

Completed preparation and application of moist dressing

The sheet wadding is spread out on the half sheet, ready for the hot, moist pad and parchment paper.

Pour the solution evenly over the pad in the towel, adding the parchment paper, slightly crushed, to receive the last of the solution.

Grasp each end of towel and wring as tight as possible.

The towel is opened, and the paper is removed and placed within the folds of the sheet wadding.

The hot, wet pad is quickly wrapped about the infected surface of the hand or forearm. It is then en-

veloped with sheet wadding and parchment paper, which serve to keep in heat and hold moisture.

The sterile towel, on which the hand has been resting, is folded square, and used to envelop the moist dressing. It is put on, and graduated folds are made from the tips of the fingers to the wrist, each fold being pinned with a small safety pin until the wrist or arm is reached, resembling a thumbless mitten when finished.

Finally, if the patient is to remain in bed, a pillow with a rubber case is placed on an inclined plane at his side, so that the hand may be higher than the elbow. This relieves the pressure from the inflammation and promotes comfort to the painful part.

These pads are usually changed hourly, or every two hours, if the part is too sensitive to be disturbed.

A posterior wooden splint may be used for immobilization. If the patient is to get up, a sling is applied.

Procedure for foot soak

Loosen upper bedclothing.

Turn spread towards head of bed, out of the way.

Turn blankets and sheet even with foot of bed.

Remove surgical cradle and pillows.

Place a doubled gray blanket on the foot of the bed, tucking in just enough to hold it in place; the other end is used to draw the upper bedclothing as far as the knees.

Slip half sheet and rubber under affected foot, and over the other foot.

Owing to the fact that the feet are more sensitive

to heat than the hands, prepare the solution in the tub at a temperature of 105°–110° F.

Fold back gray blanket sidewise sufficiently to expose the affected foot, which is slightly moved to one side.

Place tub parallel with the foot.

Remove dressing.

Support foot above and below wound, or behind the knee and ankle, and steadily lower into the tub.

Place inflated bag over the edge of tub and under the knee.

Cover the tub as for hand soak.

Pull down upper bedclothing even with the foot of bed, but not to hang over, leaving the spread undisturbed.

As the time approaches for removal of the foot from tub, prepare the moist dressing, as for the hands.

Completion of foot soak

Bedclothes are folded back again.

Blanket covering the tub is folded to one side.

Cover of tub is removed.

Sterile towel is spread on half sheet and the foot placed on end of towel, and covered up with the opposite end.

The tub is removed.

Application of the moist dressing is as that of the hand soak.

The sterile towel, in which the foot has been resting, is now folded in a square, and comes next to the pad. The point of towel extending beyond the foot is turned over the toes, the sides being brought together

in graduated folds adapted to the foot and ankle. It is then pinned up the front with small safety pins.

The foot is placed on a rubber covered pillow, which is sometimes raised upon an inclined plane for greater elevation.

The surgical cradle is replaced and the clothing readjusted.

If the patient is permitted to sit up, out of bed, a wheel chair with an adjustable extension should be provided, on which is placed a pillow with a rubber case.

Disposal of dressing

If a dry dressing, it is put in the gauze pail. If a pad, the gauze is saved and the sheet wadding is put into the boiler house bag to be burned.

The tub should be thoroughly scrubbed with sand soap and sterilized in the utensil sterilizer; or filled with hot water and placed over the gas heater until the water boils. If this is not expedient, disinfect by 2% formaldehyde solution, and allow to stand for twenty minutes.

Care of nurse's hands

In the care of septic cases, the nurse must guard against infection by protecting her hands with rubber gloves. When rubber gloves are not available, abrasions, scratches, or hang nails should be protected with flexible collodion, applied on strands of sterile gauze to hold the collodion. Following the operation, each hand is scrubbed with hot suds two minutes, then rinsed and soaked in corrosive sublimate solution 1–2000.

LXVII

RENAL FUNCTION

Purpose

To determine how nearly normal the kidneys are in functioning.

Equipment

tray set with
- 2 c.c. glass syringe and needle to fit
- sterile sponges
- 1 ampule phenolphthalein
- solution bowl with alcohol

Procedure

Intramuscular

Boil glass syringe and needle. Fit needle to syringe. While syringe is sterilizing, time can be saved by having patient void. This urine is not saved.

Disinfect ampule of phenolphthalein by washing in alcohol, break end into sterile sponge, and draw contents into syringe.

Soak a sterile sponge in alcohol and carry syringe to bedside in it. Scrub patient's arm with same sponge and inject 1 c.c. phenolphthalein into the deltoid muscle. (To children ½ c.c is given.)

Note the time in writing.

The patient then drinks 20 ounces of water, and the urine secreted during the next 2 hours and ten minutes

is collected and saved. Empty into a specimen bottle properly labeled with urine slip; also record the exact time that the urine was collected.

Send at once to house officer's laboratory, where the test is completed by adding water up to 1000 c.c., and making alkaline with sodium hydroxide. The solution exhibits a red color.

Important points

Give exactly 1 c.c. of phenolphthalein.

See that the patient voids before the test is made.

Collect specimen exactly 2 hours and ten minutes after injection.

See that specimen is properly labeled.

See that specimen is not lost, but is taken at once to laboratory.

Intravenous

The arm is prepared as usual and the phenolphthalein is injected into the median cephalic vein.

Insert catheter in bladder.

Watch for appearance time of red color; normally, three minutes.

At end of first hour from appearance time collect and save specimen.

Repeat at end of second hour. Keep the 2 specimens separate.

LXVIII

CYSTOSCOPY

Purpose

For diagnosis of bladder, ureteral and renal conditions.

Preparation of patient

On the ward

The preparation varies. The usual routine is:

catharsis night before
soapsuds enema in the morning
light breakfast
local preparation; shave not necessary, though preferred by some doctors
medication as ordered, morphia, ⅙ grain, or scopolamine, $\frac{1}{150}$ grain, or both

In the operating room

Preparation of 3 or more sterile specimen bottles as follows:

catheter specimen, marked with name, date, service, and ward
right ureter specimen, marked "R," with name, date, service, and ward
left ureter specimen, marked "L," with name, date, service, and ward

Drape patient in lithotomy position.
Catheterize patient and save specimen.
Inject 20–30 c.c. cocaine lubricant into urethra with a 30 c.c. glass syringe.
Prepare boric acid, 2% solution for bladder irrigation, amount depending on condition in bladder and urine.

Procedure

By the doctor

The cystoscope is introduced, and the bladder explored thoroughly in order to determine the presence of stone, tumor, ulceration, or any other lesion. The ureteral openings are also explored, noting swelling, pus, or blood from ureters. By watching contractions of ureteral openings, and intervals between them, information is gained of the activity of the kidney. Certain drugs, as indigo carmin, which color the urine, may be given to make the urinary whirl visible when ureteral orifices are not seen, due to pathological bladder. In case of normal kidney the colored stream should appear in the bladder in fifteen to thirty minutes after taking of drug by mouth; intramuscularly, in five to seven minutes; intravenously, in three to five minutes.

The bladder is irrigated with boric solution before passing the ureteral catheters, in order to clean the bladder walls. Specimens are obtained from both ureters. Throughout the procedure the nurse assists by holding the cystoscope, firmly, and the basin to receive

return of irrigation. Most of the pain in cystoscopy can be avoided by holding the cystoscope firmly.

After examination the patient may need morphia and a warm enema, which may act as a sedative.

Care of catheters

The caliber of the catheters is so small that to clean them it is necessary to use a 2 c.c. syringe for forcible injection of soap and water, followed by ether. They are then formalized for twenty minutes in Schering's formalin sterilizer.

LXIX

BLADDER IRRIGATION AND INSTILLATION

IRRIGATION

Purposes

Some of these are:

For cleansing and relief of inflammation of the bladder in cystitis.

For stimulation and distention when the bladder walls may be contracted. In such cases the amount of solution used is small at first and gradually increased.

For washing out the bladder after residual urine has been removed by catheterization.

Equipment

gray blanket
large sheet
half sheet and rubber
tray containing
  2 sterile rubber catheters, size 16–20, French, in a sterile towel
  sterile lubricant
  4 packages sterile picked cotton sponges
  sterile funnel and tubing with glass pipette attached
  sterile pint graduate
  kidney basin
  clean enameled pitcher and basin
  dairy thermometer
  2 finger bowls, one with hot, soapy solution and the other with hot boric solution, 2%

Preparation of the solution

A pint or more of 2% boric solution is usually prescribed for a bladder irrigation at a temperature of 105°–110° F. The solution is prepared in a sterile graduate and placed in a pitcher of hot water to hold the heat. The dairy thermometer, which has been disinfected in a solution 1–1000 corrosive sublimate, is placed in the graduate. Cover with a sterile towel and carry to the bedside in a basin.

Preparation of patient and nurse

The preparation of the patient and of the nurse's hands is the same as that in catheterization. See page 168.

Procedure

Following catheterization, the outer end of the catheter is wrapped in a sterile sponge and the kidney basin removed. The sterile towel with the extra catheter and sponges is folded back out of the way. The temperature of the boric solution is noted, the thermometer put to one side, and the graduate removed from the pitcher of hot water and placed in the basin. The basin is placed on the bed, and the sterile towel containing the funnel is placed on the foot of the bed and opened. A utensil is placed on a chair to receive the bladder washings. The nurse dips her hands in the boric solution in the finger bowl, picks up the funnel and tubing, and expels the air by pouring in some of the solution and allowing a little to run out, then pinching the tube to hold in the remainder. The pipette

is then slipped into the end of the catheter and a small amount of the boric solution, the amount depending on bladder distention or discomfort, usually 5 ounces, is poured into the funnel and the tubing is relaxed, the solution is allowed to run slowly into the bladder, being constantly regulated by slightly pinching the tube and slowly elevating the funnel without allowing the tubing to empty itself completely. After the solution is held in the bladder for a moment the funnel is quickly inverted over the basin, starting up a siphonage. Before the tubing is quite empty it is pinched, and more of the solution is poured into the funnel, a repetition of this procedure being carried on either until the outflow is free from sediment and runs clear, or until the solution is used up.

In some cases the nurse is told to let the patient retain the last funnelful of solution for further disinfection of the bladder. Sometimes an argyrol or mercurochrome, 10%, instillation may follow the irrigation of the bladder for the same purpose. Silver nitrate 1/8000 irrigation is frequently used following boric irrigation.

On the completion of the irrigation the pipette is disconnected from the catheter and the catheter pinched and slowly removed from the urethra. The patient is dried and the extra blanket, half sheet, and rubber are removed, and the patient made comfortable.

Observe the bladder washings for pus, blood, sediment, shreds of mucus, or anything unusual.

The funnel and tubing are washed, boiled, and put away with sterile precautions. The catheters are cared for as in catheterization.

INSTILLATION OF BLADDER

For this operation a long rubber catheter is used. The bladder is emptied and irrigated with 2% boric solution. With the catheter still in position the drug for treatment is drawn into a half ounce glass syringe. The air is expelled and the tip of the syringe directed into the external end of the catheter.

To prevent escape of drug, the catheter and syringe are withdrawn without disconnecting.

In the case of bladder infections, the drug ordinarily prescribed is argyrol, 10%, and olive oil, ½ ounce. In the case of an irritated bladder, oil of eucalyptol, 1 part, and olive oil, 99 parts, may be used. The drug is retained in the bladder until the normal urinary discharge takes place.

INSTILLATION OF THE URETHRA

This procedure is carried out in cases of gonorrheal urethritis. The drug is carefully introduced into the urethra by means of a small glass syringe with a blunt tip. The quantity usually prescribed is 10–30 c.c. Some of the drugs used are argyrol, 10%, mercurochrome, 1%.

LXX

APPLICATION OF A FEMALE SELF-RETAINING CATHETER

Purpose

This procedure is followed sometimes to avoid distention of the bladder by urine after operations on the bladder walls; and in some cases of incontinence, following vulvectomy and certain plastic operations.

Preparation

The local preparation of the patient and of the nurse's hands is done as if for a catheterization.

Equipment

Excepting the catheters, the equipment is the same as that used in catheterization. A special self-retaining mushroom-tipped or scroll-tipped catheter is used, and a stillet to aid its insertion into the bladder. A clean five-pint bottle and retainer, 3 feet of half-inch sterile rubber tubing, glass connecting tube, and adhesive plaster are also needed.

Procedure

The stillet is inserted into the catheter as far as it will go. The mushroom-tipped end of the catheter is drawn tightly over the point of the stillet until it no longer bulges, is then held in place, and slowly introduced into

the urethra until it is beyond the internal sphincter, *i.e.,* about 2 inches of the catheter are inserted. The stillet is carefully withdrawn, leaving the catheter in position, and the bladder is drained into the kidney basin. A glass pipette is inserted into a 3-foot length of rubber tubing and connected with the catheter. The retainer with the bottle in it is suspended at the side of the bed and the free end of the rubber tubing is dropped into the bottle, into which the bladder will drain. To hold the catheter in place, its outer end at the margin of the pipette is strapped to the back of the patient's thigh with adhesive tape. Another piece is applied around the tubing, long enough to permit fastening to the side of the bed with a safety pin.

Daily supervision of bladder drainage

The rubber tubing is usually detached from the catheter twice a day and syringed out with hot 2% boric solution, to keep it clean.

Irrigations of the bladder when on drainage

The bladder is sometimes irrigated following operations on its walls, to keep the stitches clean and to wash out blood clots, if any are present.

A pint of sterile boric solution 2% at 110° F. is prepared. The rubber tubing is detached from the catheter at the pipette, and the funnel and tubing for bladder irrigation are used. The tubing is filled with solution and pinched. The pipette is then introduced into the stationary catheter and from 3 to 4 ounces of the solution

is allowed to run into the bladder slowly, as sudden distention must be avoided. The pipette is then disconnected and the return solution runs out into the receptacle. This operation is repeated until the solution runs clear from the bladder.

Sometimes a 4 to 6-ounce glass or metal G. U. syringe is used instead of a funnel and tubing. Care must be taken that the solution is injected slowly through the catheter.

After irrigation the stationary catheter is again connected with the rubber tubing, which has been cleansed, and its end is dropped into the bottle. The catheter is left in the bladder from three to four days as a rule. If it must remain for a longer period it should be removed, washed, sterilized, and replaced.

LXXI

EYE TREATMENTS

EYE EXAMINATION

Equipment

ophthalmoscope
drop light

Drops may be ordered by the house officer.

HOT APPLICATIONS

Purpose

These applications are applied in the form of moist heat to relieve painful inflammatory affections of the eye, as in conjunctivitis and iritis.

Equipment

tray with
enameled fomentation cup
2 throat sticks
boric solution, 1–25
pledgets of absorbent cotton
bath thermometer
rubber protector for the bed
paper bag
electric or gas plate
boric acid ointment or olive oil

Procedure

The patient lies flat on his back. The rubber protector is slipped under his head and shoulders. The towel is folded diagonally and the point brought to the side of the head to be treated, and the corners of the towel tucked in on the opposite side. The nurse should always scrub her hands thoroughly before starting any treatment on a patient's eyes.

Measure 6 ounces of 1–25 boric acid solution into the fomentation cup and heat the solution to 125° F., then put several pledgets into the solution at a time. To avoid the danger of burning the patient, before applying the hot pledgets carefully lubricate the eyelid, including the margin of the lower lid and surrounding area. The ointment must not be permitted to get between the lids, since this would irritate the eye. As a further precaution, the pledgets are squeezed as dry as possible before application by making firm pressure with the throat stick.

The pledgets are usually applied constantly for fifteen minutes out of every hour. Following the application of moist dressings to the eyelids, they should be carefully and gently dried.

COLD APPLICATIONS

Purpose

Cold, moist applications are frequently prescribed in conjuctivitis and in the inflammatory affections of the glands of the eyelids, as hordeolum, or stye, and chalazion (hailstone), a small tumor on the margin of the eyelid.

Equipment

tray with
- dressing towel
- pledgets of absorbent cotton
- 2 throat sticks
- boric solution, 1–25
- pint enameled basin
- lump of ice
- rubber protector
- small paper bag

Procedure

The position of the patient and arrangement of the protector and towel are the same as in the case of hot applications.

Place the ice in the basin, measure 10 ounces of boric solution, and pour over the ice. Place cotton pledgets on the ice and carry all equipment to bedside.

Squeeze the pledgets almost dry between the 2 opposing surfaces of the throat sticks, and apply directly to the closed eyelid. Continue to change these pledgets constantly for ten minutes, or longer, until relief is obtained. The pledgets are discarded as used and placed in the paper bag to be burned. This rule should always be observed in cases of infection.

APPLICATION OF OINTMENT OR POWDER

Ointment

Ointment should be applied to the conjunctiva of the lower lid and then the upper lid be carefully pulled

down over the lower. If ointment is not in a tube, apply with a toothpick applicator. If ointments have been used frequently, it may be well to use a wisp of cotton with each lid to prevent the fingers from slipping during the treatment.

Powder

Powder should be sprinkled on the lower lid with a toothpick applicator and the upper lid be pulled down, as above.

To open lids

The upper lid should be pulled toward the frontal bone and the lower lid toward the cheek. Care should be taken never to press on the eye.

IRRIGATIONS

As to the relative value of medicine droppers and eyecups for irrigating or washing the eye, the dropper is considered the safer of the two, because in the use of an eyecup there is danger that any bacteria which might be on the lids may be washed into the eye itself. In working on the eyes be careful never to use force at any time.

Purpose

Irrigations are done for the purpose of cleansing the eyes, and for antiseptic effect in conjunctivitis. Irrigations precede all medications of the eyes, unless otherwise prescribed.

Equipment

4 small enameled basins
jar of sterile glass medicine droppers
jar of sterile pledgets
boric solution, 1–25
corrosive sublimate, 1–2000
dressing towel
rubber protector for bed

The equipment is arranged on a tray and placed on a table near the foot of the bed.

In one of the four basins is 8 ounces of warm (90°–95° F.) boric solution, in another, warm corrosive sublimate solution for the nurse's hands. One of the two remaining basins serves as a receptacle for the droppers after use. The other is for the discarded pledgets.

Procedure

The patient lies flat with his head at the foot of the bed. The protector is slipped under his head and shoulders and the towel arranged about neck and ears for protection. The nurse, after scrubbing her hands, proceeds with the operation, doing the unaffected eye first. She stands back of the patient, at his head, and carefully opens the lids by making pressure with the index finger on the frontal bone, in the region of the supra-orbital bone above the eye, and with the thumb on the superior maxillary bone below. Never make pressure on the eye itself.

A pledget of cotton may be placed at the outer canthus to prevent too rapid escape of the solution. With

the other hand one of the droppers is filled with the warm boric solution and held horizontally with the patient's eye, the body of the dropper resting on the bridge of the nose, and the eye is irrigated from the inner canthus near the nose. Never point the dropper straight toward the eye, or irrigate directly into the cornea. The affected eye is then irrigated until the eye is clean. In the case of children, cotton pledgets are used in place of droppers.

After the irrigation the dropper is discarded, and another one used if medication is prescribed which calls for the same method as irrigation. It is unnecessary to put more than 2 drops in the eye at one time, since the conjunctival sac will not hold more.

After care of droppers

In caring for the eye droppers afterwards, they should be carefully washed in hot soapsuds, boiled for ten minutes, and after they are perfectly dry, returned to the sterile jar, which should have sterile absorbent cotton in the bottom to protect the fragile tips of the droppers. The jar is covered when not in use.

Droppers for different drugs

To prevent the use of the same dropper in different solutions, which might prove serious in treatment of the patient's eyes, droppers having different colored bulbs are employed as a means of identification, *i.e.,* for

Mydriatics, drugs which dilate the pupil, *red bulbs*

Myotics, drugs which contract the pupil, *white bulbs*

Antiseptics, drugs which neither dilate nor contract, *black bulbs*

REMOVAL OF FOREIGN BODIES

One of the simplest and most effective ways of removing at once particles of sand or cinders from the eye is for the person to grasp the upper eyelid in the middle with thumb and index finger and with an outward and downward motion allow the lid to sweep over the eyelashes of the lower lid. This may have to be repeated, but usually relieves the first time. Always refrain from rubbing the affected eye.

The presence of a foreign body in the eye is extremely painful because of the rich nerve supply of the conjunctiva and cornea. For this reason a local anæsthetic is usually instilled before any attempt is made to remove the foreign body. The anæsthetics used may be cocaine solution, 4%, holocaine, 1–2%, or butyn, 2%. Holocaine is sometimes used in preference to cocaine because it accomplishes the purpose without drying the cornea or dilating the pupil.

Foreign bodies usually consist of particles of dust, cinders, eyelashes, etc., which may be removed by simple irrigation of the eye, using a medicine dropper with warm boric solution, 1–25, normal saline solution, or sterile water, although water is irritating if used to any extent for irrigating purposes. To the patient it sometimes seems as if the particle was in the cornea, because of the pain, when it is really imbedded in the conjuctiva of the upper lid. In such cases the eyelid should be everted so that it may be removed.

To do this, have the patient look down, then use a toothpick, match, or pencil in one hand to press down the upper lid, while with the other hand grasp the eye-

lashes and turn the lid out and up, over the instrument used, then with a cotton swab quickly dislodge the particle. To return the lid to its normal position, have the patient look up; this permits the lid to roll back. When one becomes proficient in everting the eyelid, it can be done entirely with one finger.

Care should be taken to remove the entire foreign body. If only part of it is removed, the remainder may cause an infection of the eye which may be serious. Stains from iron or emery are always entirely removed. Any foreign body on the cornea is a menace to the eye because an abrasion of the cornea in the presence of an infected tear sac may lead to a corneal ulcer, and at times to the loss of the eye.

To relieve the irritation following removal of a foreign body, zinc sulphate solution, ⅛ of 1%, is used, combined with holocaine, 1%, or an instillation of argyrol, 20 to 25%, or mercurochrome, 1–2%.

Any particle imbedded in the eyeball, such as emery or steel, should be removed by a doctor, and as first aid a light dressing may be applied for comfort until the eye can be cared for. The patient should be cautioned not to rub the injured eye, as it only serves to increase the irritation.

INSTILLATIONS OF THE EYE

Mydriatics

All mydriatics are used for ocular refraction, also frequently for treating certain eye diseases.

For refraction

The drugs most commonly used are homatropine and atropine.

Homatropine, 2%, 1 drop is instilled into each eye every ten minutes for 1½ hours. In giving homatropine, the nurse should write on paper the time and number of doses to be given, and check off each dose when given.

Atropine sulphate, ½%, 1 drop is instilled into each eye 3 times a day for 3 days. This is usually done at home.

In an office or clinic the patient is permitted to sit upright in a chair and incline his head backward, resting it against the wall. The bottle, dropper, and cotton ball should be placed near the patient. The nurse stands in front of the patient, holding the dropper in the horizontal position, at the same time requesting the patient to open both eyes and look up to the ceiling. With the thumb and index finger the lids are separated and the drop is placed in the middle of the lower *cul-de-sac* of the eye.

In using atropine sulphate it is wise to instruct the patient to make pressure at the internal canthus in order to prevent the poisonous drug from entering the nasopharynx through the lacrimal ducts. All mydriatics are poisonous.

For irrigation and treatment of certain diseases

The patient lies in horizontal position with the nurse standing.

Always irrigate both eyes with boric solution, doing the well eye first. Fill the dropper with solution and

irrigate until the eye inside and out is clear and free from secretions. Instill the solution a little nearer the external canthus in order to flush the whole eyeball.

Follow irrigation with medicinal drops.

Ointment should be put in last if ordered.

Myotics

The chief uses of myotics are:

In glaucoma cases, when the intraocular pressure has increased; this helps to decrease the obstruction at the anterior angle.

To counteract a mydriatic.

In paralysis of accommodation, when the pupil is dilated; the myotic stimulates the ciliary muscle.

In cases of iritis or iridocyclitis with dilated pupil, showing any evidence of secondary glaucoma with increased tension. Pilocarpine is alternated with atropine and observed very closely.

Caustics

As an illustration of the use of caustics the treatment of Trachoma is given.

Trachoma is a contagious disease of the eyes, characterized by granules in the conjunctiva of the lids.

Nursing care

Special precautions are observed and the patient is isolated.

Boric acid, 3%, irrigations are given 3 or 4 times a day.

A compound zinc oxide ointment, half strength, is applied 4 times a day.

Boric ointment is applied at bedtime.

Copper sulphate stick (blue vitriol), 10%, a caustic, is used by the doctor either once a day or every other day, just as the patient can stand it, for the pain resulting from the use of copper stick is intense. When the inflammation has begun to subside, the use of the copper stick is decreased and a mixture of glycerite of copper, 1–20, is substituted. Instill 1 drop of this solution into the eyes 3 times a day.

The copper stick is generally used, however, once each week. As the patient becomes accustomed to the solution of copper, each day decrease the drops of water, and work up a tolerance until he can stand the solution at full strength. It is seldom that a solution stronger than 1–10 can be tolerated.

RESTRAINT AND POSITION OF A CHILD FOR EYE, EAR, NOSE AND THROAT TREATMENTS

Method I

Equipment

1 blanket or sheet
3 large safety pins

Procedure

Fold the blanket or sheet to form a rectangle. Lay the child on the blanket so that the folded edge of the blanket will come well up to the neck. Fold the blanket firmly over the child diagonally across the chest, from the left to the right. Likewise, fold the blanket from the right to the left, covering the entire body and form-

ing a "V" at the neck. Pin the blanket at the shoulder, knees, and ankles. By using this method the child can be held securely by one person for irrigation or treatment.

METHOD I

Method II. For eye treatments

Equipment

1 stool or child's low chair
1 bedside chair
1 small rubber sheet
1 half sheet

Procedure

The nurse should sit in the large chair with the patient in front of her, sitting on the stool. Place the rubber sheet, which has been covered with the half sheet, on her lap. The child should lie back with its head between the nurse's knees.

METHOD II

Because of the importance of the nursing care, cataract and ophthalmia neonatorum have been added to the eye treatments.

CATARACT

Cataract is a disease of the eye manifested by partial or complete loss of sight due to pathological changes in the crystalline lens, causing opacity. This disease may be congenital, it may follow injury to the eye, and is most common in senility.

Operation is resorted to for the removal of cataract. Such an operation is a great strain on the patient nervously, since by necessity it is done under local anæsthesia, because the restlessness and straining that usually follow general anæsthesia may result in permanent damage to the eye by causing the vitreous humor, which is a semi-fluid, to escape.

On entrance to the hospital these patients have a physical examination and urine test before operation.

Equipment for local preparation

tray with
- pair small curved scissors
- boric acid ointment
- 4 small enameled bowls
  - (1) warm boric acid solution, 2%
  - (2) soap solution
  - (3) sterile water
  - (4) corrosive sublimate, 1–10000
- jar sterile cotton pledgets
- bottle of homatropine, 1%
- 1 sterile eyepad—2 by 2½ inches
- cotton bandage—1½-inch

The sterile eyepad is made of absorbent cotton, with a layer of muslin covering the inner surface which comes next to the patient's eye.

Procedure

The patient sits on a low-backed chair, and the first step in the preparation is clipping the cilia, or eyelashes. To prevent the clipped lashes from falling into the eye, the points of the scissors are smeared with boric acid ointment on a pledget of cotton. The nurse stands behind the chair at the patient's back and supports his head with her arm to steady it, at the same time reassuring the patient. With the curved point of the scissors directed away from the patient's eyes, she

clips the eyelashes of the upper lid, wiping off the scissors on the ointment covered pledget after each clip. In removing the eyelashes from the lower lid, the nurse holds the upper eyelid out of the way to prevent the patient from winking while she clips the lashes. Each eye is now irrigated with the boric solution, starting with the unaffected eye, and if medicinal drops are ordered they are now introduced.

The patient's hair is smoothed back, and a clean cotton head covering, like a nightcap with strings, is put on, and the strings tied at the side out of the way. The patient is now instructed to close his eyes, and the area about the affected eye is prepared, the supra-orbital bone, which includes the eyebrow, the bridge of the nose, and superior maxillary, well down on the cheek.

Using a fresh pledget of cotton with each solution, beginning with the soap solution, washing off the soap solution with the sterile water, finally the corrosive sublimate solution, the area about the eye is sponged dry, the pad is placed over the eye, and the bandage applied to hold the pad in place.

A red pencil mark is made upon the cheek under the eye to be operated on. Under no circumstances should this be overlooked.

Post-operative treatment

On completion of the operation a pad is placed over both eyes, fastened down at each side with court plaster, and a single knitted bandage is applied over both eyes and secured at the side of the head with four tapes.

After the operation the patient is moved to the ward

in the same bed in which he was operated on. Stretchers are seldom used, as the jar causes injury to the operated eye.

The patient should be instructed to lie quietly on his back for 4 hours, after which he may be turned to the side opposite the operated eye. The patient should not move without assistance for the first 24 hours.

Any nausea or desire to cough should be reported and be treated at once. Codeine, grain, ½, by mouth may be prescribed.

Dressings

Both eyes should have a sterile dressing and be bandaged for 3 days.

Diet

For the first 12 to 24 hours a very light diet (soft-solid) without milk, followed by house diet, unless ordered to the contrary.

Catharsis

None for 2 days following operation. Enema on the third day.

Care of the eyes

The patient should remain in bed until the fourth day, with both eyes bandaged. On the fourth day the well eye may be uncovered and the patient be allowed to sit up. During this time a shade that covers both eyes should be worn. The patient should be in a semi-lighted room, as a bright light is very uncomfortable.

When both eyes are uncovered, usually the eighth day, the patient should be provided with a pair of dark glasses. Under no circumstances allow a patient to wear his own glasses.

THE BLACK RING MASK

A black Ring mask should be worn at night for at least 2 weeks following the operation.

The patient is discharged with dark glasses.

OPHTHALMIA NEONATORUM

Ophthalmia neonatorum is a contagious disease caused by several different organisms—the gonococcus, pneumococcus, staphylococcus, streptococcus, etc. The gonococcus causes a much larger percentage of the disease than any other organism. This infection is manifested by severe inflammation of the eyes and conjunctiva with a purulent discharge. This disease used to cause about 50% of all blindness, but now causes only 17%. Much of this decrease is due to the mechanical cleansing of the eyes with boric solution, followed with instillations of nitrate of silver solution in the eyes of the new-born before they are taken from the delivery room. This is known as Credes' method of prophylaxis.

Besides the new-born who have been infected from the mother during birth, adults may become infected either through carelessness, by infecting their hands and then rubbing their eyes, or by using soiled towels which

have come in contact with the organism. Doctors and nurses may be infected by accident during a delivery or when giving a treatment, by a drop of pus entering the eye. In such an emergency avoid rubbing the eye and report at once for treatment, which consists of irrigation by boric acid, 3%, followed by instillations of argyrol, 25%.

The nurse should wear glasses and gown for protection, keep her hands away from her face and hair, and scrub her hands thoroughly between each case. All discarded material is burned and all utensils sterilized.

Methods of protecting the unaffected eye

When only one eye is infected care must be taken not to spread the infection to the clean eye. As long as there are no signs of irritation the clean eye is not irrigated, as in other eye treatments. The infant should lie on the side of the infected eye, so that the discharge will not drain into the unaffected eye. If he is restless, the mattress behind his back may be elevated by tucking a small pillow or folded blanket under it, or the infant pinned down in blankets. Sometimes an artificial bridge of absorbent cotton and collodion is made on the infant's nose to prevent the discharge from passing into the clean eye. Another method of protection sometimes used is to apply iodoform powder to the clean eye with a toothpick swab, and over that a pad is applied, held in place with a gauze bandage. Additional padding should be placed under the bandage where it passed over the bridge of the nose, to ward off any discharge. This dressing should be changed every day, and

the eye closely observed. If any irritation, the bandage is omitted, and the condition reported. A bandage is never applied over the infected eye.

Buller's shield

A Buller's shield, which is used to protect the eye of an adult or child against infection, is too large for an infant, as it would almost rest upon the eye itself.

Method of making the shield

Use an ordinary watch crystal and 2 pieces of adhesive plaster, 1 of which should be 2½ inches square, the other, 3 inches square. Cut a hole 1 inch in diameter out of the center of each piece of adhesive plaster. Attach the smaller piece to the concave or under side of the crystal, and the larger to the convex or outside of the crystal. The outside piece of adhesive being larger, allows a margin for attachment to the patient's skin.

The shield is now ready to place over the clean eye, and in order to permit entrance of air to the eye, without danger of infection, a small corner is snipped from the adhesive on the shield on the temporal side. A little absorbent cotton is placed under the adhesive plaster near the bridge of the nose. Finally small wisps of absorbent cotton are fastened with collodion about the edges of the adhesive plaster for reinforcement against leakage from the affected eye.

The shield may be left on for 2 or 3 days without changing unless signs of irritation are evident.

Before applying Buller's shield, careful examination

of the eye is made for any conjunctival redness, or the presence of any discharge, and the eye thoroughly cleansed and dried.

Irrigation

If the infant's eyes are badly swollen on admission to the hospital, cold compresses may be applied for ten to fifteen minutes every hour or every 2 hours. These are discontinued after 24–48 hours. The eyes are irrigated with boric solution, 3%, every hour. If the discharge is very profuse, the eye may be irrigated every ten or fifteen minutes, or as often as necessary to observe absolute cleanliness. For this purpose a small Davol syringe is used, or a dropper with a piece of fine rubber tubing attached. All the discharge must be removed from the eye at each irrigation. The pus forms very rapidly, so that often the lids are bulged out from the pressure. Then when the lids are opened the pus escapes in a stream, and in these cases the nurse must guard against infection. If accidentally infected, she should report at once for treatment.

Zinc sulphate solution, 1/10 of 1%, is a mild antiseptic, which may safely be used every 2 hours. Sometimes a solution of mercurochrome, 1%–2%, is used, alternating every 2 hours with a solution of protargol, 4%, or a solution of argyrol, 25%. Again the mercurochrome may be used every 2 hours for 3–4 days and then either protargol or argyrol used for 3–4 days. They cannot be used indefinitely because of the danger of staining the eye brown.

If the condition is very obstinate, silver nitrate solu-

tion, 1–2%, may be swabbed on the mucous membrane lining the lids once a day by the doctor, as it has specific action on the pus cells. This treatment causes increased swelling and discharge temporarily but is very efficacious in clearing up such discharge. Boric acid ointment is always applied freely to the lids to prevent them from adhering together, and also to keep the skin soft and free from irritation.

Atropine solution is used very cautiously with infants because of the danger of poisoning. Atropine ointment is used for infants once or twice a day in preference to a solution. With adults a solution of atropine, 1%, is used 3 times a day until the pupil is well dilated. After that, enough is used to keep the pupil dilated and at rest.

One serious complication that may arise is a corneal ulcer. In an infant, if treatment is started soon enough and the eye kept free from pus, the ulcer will not form. In an adult ulcers may form even with the most careful treatment. Frequently these perforate with a resulting loss of vision.

When a patient has an ulcer he is always kept in bed and as quiet as possible to lessen the danger of perforation. Mydriasis must always be kept up at this time to prevent adhesions of the iris forming.

The amount of vision lost depends on the size of the ulcer and the location. If it is in front of the pupil, more vision will be lost than if the ulcer is near the margin of the cornea. After the ulcer has healed yellow oxide of mercury may be applied to the eye and the lid massaged carefully.

For severe pain in the eye a solution of dionine, 2%, an alkaloid of morphine, may be instilled when necessary. Aspirin is almost considered a specific for eye pain, so that grain X may be given every 4 hours. For very severe pain codeine or morphine may be given.

In adults with a systemic gonococcus infection, general treatment must not be overlooked. Whenever possible infants who have been breast fed should continue having breast milk. It has been proved that this is indirectly conducive to shortening the course of the disease. Patients with gonococcus infections are kept on precautions until the eyes are free from discharge and 3 consecutive smears have proved to be negative.

LXXII

TREATMENTS OF EAR, NOSE, AND THROAT

EAR EXAMINATION

Equipment

graduated set ear speculums
toothpick swabs, points thoroughly covered
kidney basin
extra cotton
ear forceps
drop light
head mirror

EAR IRRIGATIONS

Purpose

For the cleansing and therapeutic effect of heat, following a paracentesis of the drum membrane in acute otitis media.

For cleansing purposes in suppurating ears.

To dislodge excess and impacted cerumen of the canal.

To dislodge epithelial plugs, a collection of epithelial cells due to dryness of the skin in the external canal.

To dislodge foreign bodies in the external canal.

Equipment

irrigating stand
irrigating can with 5 feet of rubber tubing and a metal clamp

sterile medicine dropper, its bulb removed and its tip covered with sterile fine rubber tubing 2 inches long
sterile toothpick swabs
kidney basin
pint graduate
2 large pitchers { (1) hot solution / (2) cold solution
enameled basin

Procedure

Prepare 1 to 2 quarts of solution as ordered, usually saline, and at 110°–112° F., if the patient can tolerate it. Pour the solution into the can, which should be elevated not more than 3 feet above the patient's head. Attach the medicine dropper to the tubing of the irrigating can to serve as irrigator. In irrigating the ear of an adult, or child over 8 years of age, it is best to have the patient sit up in a chair beside the irrigation stand. Cover the patient's shoulders with the rubber cape and towel. If the patient is able, he may assist by holding the kidney basin close to his neck below the affected ear.

Before irrigating, a little of the solution is run out into the empty basin to let out the air and equalize the temperature of the solution. Pull the auricle upward and backward with one hand; with the other, rotate the tip of the irrigator in the external part of the canal, always directing the stream toward the canal instead of straight toward the drum membrane. The irrigation is continued until the return flow is clear, or until about 1 quart of the solution has been used. Finally, wipe the ear perfectly dry with cotton swabs.

If any drops are ordered they are put in the ear after irrigation. In order to get the desired effect, have the patient incline his head in the direction opposite to that of the affected ear.

Irrigation of an infant's ear

The equipment is the same as that for the adult. It is almost always necessary to resort to the blanket restraint, and therefore the infant will have to be lying down. The irrigating can should be not more than 2 feet above the patient's ears. The auricle should be directed down and back. The irrigating rubber tip should not be permitted to pass beyond the entrance of the canal, as in the infant the canal is very shallow.

Cerumen

Impaction in the ear of cerumen, or wax, is apt to interfere with the hearing, and give rise to other local discomforts from pressure on the ear drum. In some cases, in order to loosen the wax before syringing, a few drops of hydrogen peroxide are instilled into the ear and held for a few minutes.

It is usually necessary to use force in syringing to dislodge the wax, and for this purpose a large metal or glass syringe is used, and a warm solution of soda bicarbonate, 10%. The tip of the syringe is supported between the index and third finger of one hand; the other supports or steadies the patient's head, to prevent any injury to the ear should the patient move his head suddenly. When the operation is over, the external canal should be thoroughly dried with sterile pledgets of cotton. If the ear is sensitive to the air, a piece of

cotton is placed over the external opening for a few days.

FOREIGN BODIES

Hard foreign bodies may be found in the ears of children, who in play may insert peas, beans, seeds or buttons into the external canal. Such cases should not be tampered with by unskilled hands because of the danger of pushing the obstructing body farther in and against the delicate structure behind it. If the foreign body be a vegetable seed of any kind, a few drops of alcohol are instilled into the external canal and held for ten or fifteen minutes to dehydrate the seed and cause it to shrivel; followed by instillations of sweet oil, when it may be more readily removed. Irrigations of water should not be used, as it tends to swell the seed.

The accidental entrance of a winged insect may be the cause of great discomfort. Sometimes instillations of warm saline solution or warm oil will hold the wings together and relieve the pain until the ear is syringed out. A few drops of chloroform or ether may be used to kill the insect.

PREPARATION FOR MASTOID OPERATION

Equipment

tray with
- safety or straight razor
- 4 small basins
  - (1) water
  - (2) soap solution
  - (3) corrosive solution, 1–10000, or alcohol
  - (4) for waste

4-inch sterile gauze
package 1½-inch bandage
collodion
red pencil
adhesive plaster
equipment for irrigation

General preparation

Night before
bath
shampoo
light supper
water to drink during night

Morning
soapsuds enema

Local preparation

Part the hair off in a semicircle before cutting. Shave the mastoid area an inch over the ear unless otherwise ordered. If a woman, leave a lock of hair in front of the ear. Braid the hair closely and fasten all hair away from the area with a semicircular strip of gauze covered with collodion.

Irrigate the ear as for an irrigation treatment. Wipe the canal dry. Scrub the area with soap solution, water, corrosive solution, or alcohol. Then apply a sterile dressing and a bandage. If the ear protrudes, put sufficient gauze behind the auricle to prevent its being pressed against the head and causing pain. Mark the cheek of the operative ear with a red pencil.

Radical mastoid

The field should be shaved for about 2 inches back of the ear. In other respects the procedure is the same as for simple mastoid.

In addition a skin graft may be undertaken. Then, unless otherwise ordered, the right thigh is shaved, scrubbed, and a sterile towel is bandaged on. It is well to apply strips of adhesive plaster at top and bottom of the dressing so it will remain secure if the patient moves.

NASAL IRRIGATIONS

Purpose

To apply heat and remove discharge from the nose in chronic rhinitis and sinusitis.

To remove crusts and neutralize odor in atrophic rhinitis and ozena.

Equipment

irrigating stand
irrigating can, to which is attached 5 feet of rubber tubing and metal clamp
glass nasal douche tip
basin
rubber cape
dressing towel
bath thermometer
measuring glass
1–2 quarts sterile saline solution

Procedure

Prepare 1–2 quarts of solution as ordered, at a temperature of 110°–112° F. Those most frequently used are normal salt solution, potassium permanganate solution, 1–6000, soda bicarbonate solution, 1 dram to a pint of water.

Fasten the rubber cape with the towel over it around the patient's neck. In irrigating the nose have the patient bend forward slightly from the hips and keep the chin in a horizontal plane. This position keeps the solution from passing to the throat, through the Eustachian tubes to the middle ears, or into the sinuses, and causing additional infections. Start the flow, to expel the air, then introduce the douche tip to follow the course of the septum, and direct it upward slightly. Wash one nostril and then the other until the solution returns clear.

FOREIGN BODIES IN THE NOSE

Foreign bodies in the nose, like those in the ear, are introduced through playful intent by a child. Relief may be obtained by having the patient close his mouth, and with his finger pressed against the unaffected side of his nose, forcibly blow with the other.

Attempts at removal by instrumentation should be undertaken only by one with special training.

THROAT IRRIGATIONS

Purpose

For the application of heat in pharyngitis and tonsillitis.

Equipment

irrigating stand
irrigating can, to which is attached 5 feet of rubber tubing and metal clamp
throat irrigating tip, similar to ear irrigating tip, protected with 2 inches of fine tubing
basin
rubber cape
dressing towel
bath thermometer
measuring glass
1–2 quarts sterile solution

Procedure

Prepare 1–2 quarts of the solution ordered, most frequently normal salt solution at a temperature of 110°–112° F.

Fasten the cape with the towel over it around the patient's neck. Have the head well over the basin so that the patient will not swallow any of the solution, and to prevent it going up the Eustachian tube. Move the tip from side to side up and down so that as much of the pharynx as possible is irrigated.

TRACHEOTOMY

Purpose

Tracheotomy is done to relieve difficult breathing, usually because of an obstruction in the larynx. Difficult breathing may be caused by a neoplasm such as

papilloma, or a malignant growth, lues, paralysis of the vocal cords, laryngeal diphtheria, foreign bodies, etc.

Foreign bodies are sometimes removed from the lungs through the tracheotomy incision.

Equipment

scalpel
straight scissors
smooth forceps
tooth forceps
2-fork retractors
tracheal hook
dilator
3 hemostats
tubes of various sizes
silkworm gut
plain catgut, No. 1 or No. 2
sterile towels
sheets
sponges
linen tape
Mosher dressing

Local preparation

For the local preparation, scrub the area with green soap, bichloride of mercury solution, 1–1000, or a 3% solution of iodine and alcohol may be used. If the patient is a man the local region is shaved. No dress-

ing is applied, as the local scrubbing is done in the operating room.

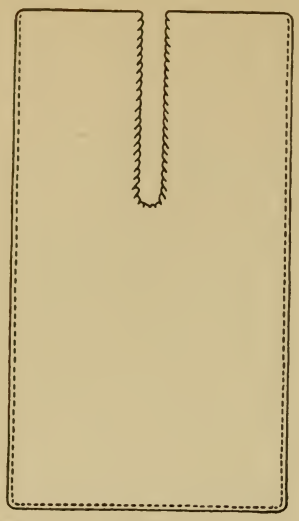
Procedure

During the operation the patient, whether an adult or a child, is usually in a reclining position. The head may be raised from 6 to 10 inches if the patient has difficulty in breathing. A rolled blanket, sandbag, or small pillow should be placed under the cervical spine to make the trachea more prominent. If the operation is an emergency one, no anæsthetic is given. If not an emergency, and if the patient is 12–14 years or more, it may be done under a local anæsthetic. For this purpose a solution of novocaine, ½–1%, is injected in the tissue around the trachea. In some cases ether may be given.

The incision is made either just above or just below the isthmus of the thyroid. The high type of operation is usually considered better unless the patient is to have a complete laryngectomy, then the low type is done.

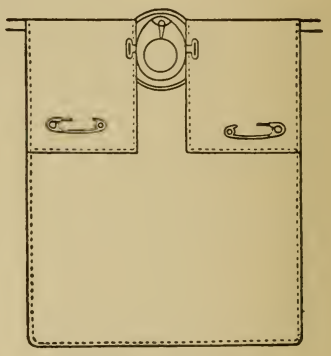
A small vertical incision is made in the skin and any bleeding stopped before the trachea is opened with a vertical incision. The patient should be warned that he will probably cough as soon as it is opened.[1] If the operation is an emergency, the tube, which is usually of silver, is slipped in, tied on, and a dressing put on. When the tube is slipped in, care should be taken not to strike the posterior wall of the trachea, as a violent attack of coughing will result. To hold the tube in

[1] If the patient is instructed to keep the mouth shut when the trachea is opened the coughing spasm will be very much reduced.



MOSHER DRESSING, UNFOLDED

place, a piece of tape about 40–45 inches long is passed around the patient's neck, slipped through the openings in the outer part of the tube, and then tied in back of the neck. Sometimes the two thicknesses of tape around the neck are uncomfortable. Then 2 pieces, each one about 12 inches long, are used. One end of each one is knotted. The free ends are slipped through the slits in the tube and then tied back of the neck.



DRESSING IN POSITION

To protect the incision, the Mosher dressing is used with very good results. This, when finished, has 4 to 6 thicknesses of gauze, and is about 5 by 7 inches, with a slit about 2 to 3 inches long through the middle of one end. The important part of the dressing is to have no raw edges. All the edges are turned in and are sewed, to make sure no threads of gauze may ravel off. The slit ends of the dressing are slipped up under the tape which holds the tube in place, brought down

over the tape, and fastened to the lower part of the dressing with small safety pins. Boric ointment is spread on the skin under the dressing before applying.

If the operation is not an emergency, a window is cut in the trachea. A small-sized ring punch may be used to bite a piece of cartilage from the trachea; first on one side of the incision and then on the other. The danger of this is that the pieces of cartilage may fly from the punch into the trachea and be inhaled into the lungs. Instead of using a punch, the cartilage may be grasped with forceps and excised with a knife. When this is done the tube is not put in for 4 or 5 days. This allows the patient to become accustomed to breathing through the opening without having the possible irritation of the tube at first. The initial incision is made short enough so that no sutures are used after the operation. When a tube is not used the dressing is fastened on the neck with a long strip of adhesive.

For an emergency operation a penknife might be used, and if no other instruments were near, the blunt end of a large bone hairpin might be inserted to hold the incision open.

After care

After the operation the patient should lie on his stomach with a pillow under his chest for about 12 hours. This allows the mucus to drain from the trachea and not be inhaled. At the expiration of the 12 hours the patient may have a headrest for comfort. A nurse should stay with the patient for the first 24 hours at least.

Care of the tube

The inner tube should always be taken out from the outer tube to be cleaned, so that the mucus will not be pushed back into the trachea. If the tube sticks, forceps may be used to pry it loose. The outer tube is never removed by the nurse, as it may be extremely difficult to replace.

The inner tube should be cleaned as often as necessary with boric acid solution, using either pipestem cleaners or feathers. Strips of gauze moistened with boric acid solution may be pushed through the tube with forceps if nothing else may be had. It may be necessary to clean the tube as often as every fifteen minutes to ½ hour the first few days after the operation. As the secretion gradually decreases, the tube will not need to be cleaned so often. Small pieces of gauze may be used to wipe away the secretion from the mouth of the tube. Care must always be taken that no threads of the gauze are inhaled. The dressing over the wounds should be changed as often as it becomes soiled. This will help to prevent an infection of the incision. Boric ointment around the incision helps to prevent infection and any irritation of the wound.

The room where the patient is should be about 80° F., and the air should be kept somewhat moist. If the patient is having great difficulty in breathing, a croup tent and kettle may be used. Care should be taken that the patient is not in a draft. The temperature, pulse, and color should be carefully watched.

Frequently the tube is removed for a short time before it is removed permanently. Then instruments to

dilate the opening should be ready in case the patient cannot breathe without the tube.

Sometimes the tube may be left in the trachea for a few days or weeks, or it may be left in permanently, according to the cause for the operation. If the patient wears the tube constantly, a handkerchief may be knotted around the neck to cover the tube, or some other light dressing may be used. This helps to keep the patient from being so conspicuous on account of the tube, and the sight of it might upset some people. It also helps to strain the air before it enters the trachea.

Occasionally, when the patient is about ready to do without a tube, a cork may be shaved down enough so that it only partially obstructs the tube. It is pushed firmly into place so that the patient cannot blow it out. This is left in for a short time the first day if the patient can breathe with it. The next day a cork, which obstructs the opening a little more, is used. The size of the cork is gradually increased until the opening is entirely obstructed. This gradual closing of the tube assures the patient that he can breathe normally when the tube is removed.

Dangers associated with tracheotomy

The patient may develop bronchopneumonia. If the wound becomes infected, pus may be inhaled and cause a septic pneumonia. If the scalpel nicks the posterior or lateral wall of the trachea an emphysema of the thorax may develop.

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